Queensland AGRICULTURAL JOURNAL

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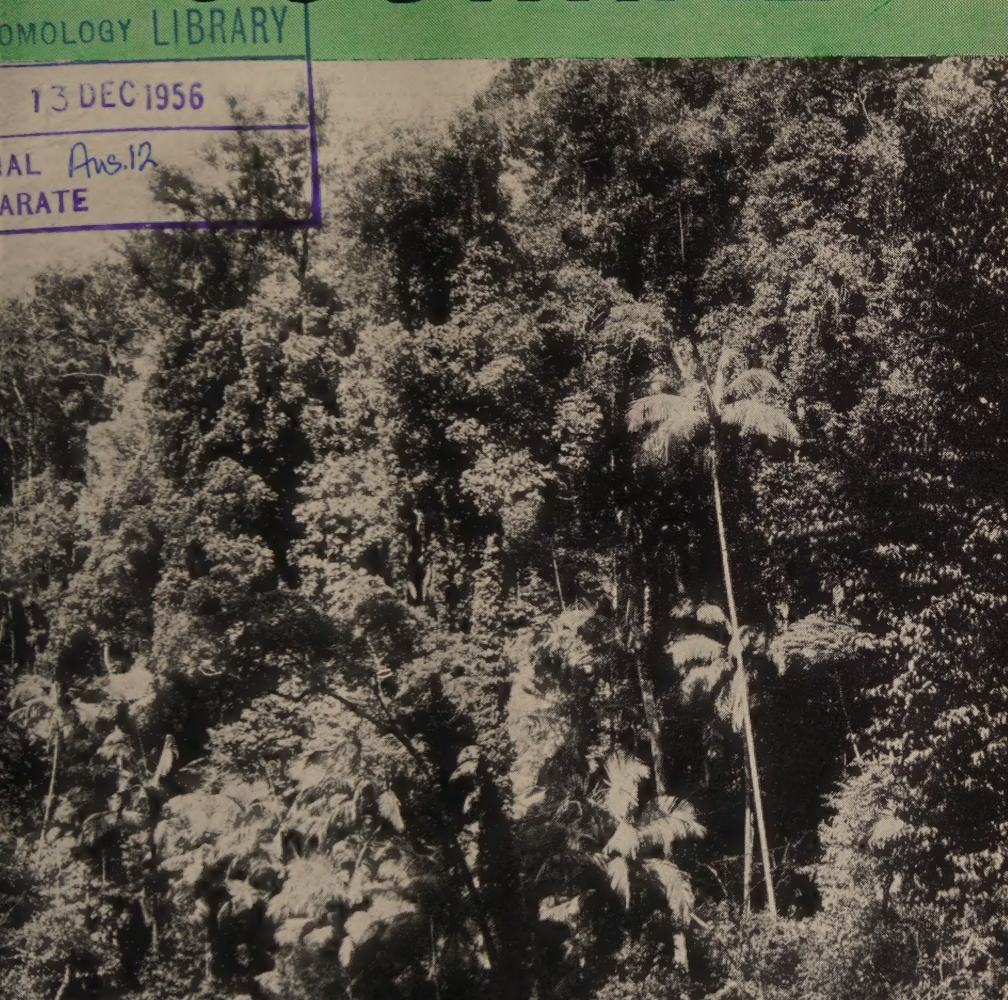

RAIN-FOREST OF THE McPHERSON RANGE.

Vol. 82 SEPTEMBER, 1956 No. 9

Registered at the General Post Office, Brisbane, for transmission by Post as a Newspaper.

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Editor: C. W. Winders, B.Sc.Agr.

The "Queensland Agricultural Journal" is issued monthly by the Queensland Department of Agriculture and Stock, Brisbane.

The subscription rate for Queensland primary producers whose main source of income is the land, for schools and for students is one shilling a year. The charge to others is ten shillings a year.

Brucellosis-Tested Swine Herds (As at 31st August, 1956).

Berkshire.

A. P. and N. Beatty, "Deepdene," Barambah road, Nanango
S. Cochrane, "Stanroy" Stud, Felton
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" Stud, Beaudesert
H. H. Sellars, "Tabooba" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
R. H. Crawley, "Rockthorpe" Stud, *via* Pittsworth
F. R. J. Cook, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
J. H. N. Stoodley, "Stoodville," Ormiston
H.M. State Farm, Numinbah
N. F. Cooper, Maidenwell
E. J. Clarke, "Kaloon" Stud, Templin
M. G. and R. H. Atkins, "Diamond Valley" Stud, Mooloolah
W. F. Ruhle, "Felbrie" Stud, Kalbar
L. Puschmann, "Tayfeld" Stud, Taylor
C. E. Edwards, "Spring Valley" Stud, Kingaroy
G. McLennan, "Murcott" Stud, Willowvale
H. M. Wyatte, "Cumberland Vale," Cooyar
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 378, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
The Marsden Home for Boys, Kallangur
M. F. Callaghan, Lower Mount Walker, *via* Rosewood
E. R. Kimber, Block 11, Mundubbera
K. B. Jones, "Cefn" Stud, Pilton
A. J. Potter, "Woodlands," Inglewood
Regional Experiment Station, Hermitage
L. Pick, Mulgildie
J. W. Bukowski, "Secreto" Stud, Oxley
R. Astbury, "Rangvilla," Pechey.

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
K. B. Jones, "Cefn" Stud, Pilton
R. Postle, "Yarralla" Stud, Pittsworth
B. J. Jensen, "Bremerside" Stud, Rosevale, *via* Rosewood
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud, Moorang, *via* Rosewood
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
V. P. McGoldrick, "Fairymeadow" Stud, Cooroy
S. T. Fowler, "Kenstan" Stud, Pittsworth
W. Zahnow, Rosevale, *via* Rosewood
Regional Experiment Station, Biloela
G. J. Hutton, Woodford
H. L. Larsen, "Oakway," Kingaroy
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes
G. I. Skyring, "Bellwood" Stud, *via* Pomona
O. B. Vidler, Manneum, Kingaroy
K. F. Stumer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
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C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri
L. Stewart, Mulgowie, *via* Laidley
D. T. Law, "Rossvill" Stud, Trouts road, Aspley

Tamworth.

D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
A. J. Surman, "Namrus" Stud, Noble road, Goodna
Department of Agriculture and Stock, Regional Experiment Station, Kairi
E. C. Phillips, "Sunny View," M.S. 90, Kingaroy
F. N. Hales, Kerry road, Beaudesert
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe
A. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
H.M. State Farm, Numinbah
F. Thomas, "Rosevale" Stud, M.S. 378, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
R. H. Coller, Tallegalla, *via* Rosewood
A. J. Potter, "Woodlands," Inglewood
D. V. and P. V. Campbell, "Lawn Hill," Lamington
S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
C. R. Smith, "Belton Park" Stud, Nara
H. H. Sellars, "Tabooba" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
R. A. Collings, "Rutholme" Stud, Waterford
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
"Wattledale Stud," 492 Beenleigh road, Sunnybank.
Kruger and Sons, "Greyhurst," Goombungee
A. Scott, "Wanstead" Stud, Grantham

British Large Black.

H. W. Naumann, "Parkdale" Stud, Kalbar

Tuberculosis-Free Cattle Herds.

The studs listed below have fulfilled the conditions of the Department's Tuberculosis-free Herd Scheme to 31st August, 1956.

Breed.	Owner's Name and Address.
Aberdeen Angus ..	The Scottish Australian Company Ltd., Texas Station, Texas
A.I.S.	M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
	F. B. Sullivan, "Fermanagh," Pittsworth
	D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
	W. Henschell, "Yarranvale," Yarranlea
	Con. O'Sullivan, "Navillus" Stud, Greenmount
	H. V. Littleton, "Wongalea" Stud, Hillview, Crow's Nest
	J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
	Sullivan Bros., "Valera" Stud, Pittsworth
	Reushle Bros., "Reubydale" Stud, Ravensbourne
	H. F. Marquardt, "Chelmer" Stud, Wondai
	A. C. and C. R. Marquardt, "Cedar Valley," Wondai
	A. H. Sokoll, "Sunny Crest" Stud, Wondai
	W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
	G. Sperling, "Kooravale" Stud, Kooralgin, *via* Cooyar
	C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
	W. H. Thompson, "Alfa Vale," Nanango
	S. R. Moore, Sunnyside, West Wooroolin
	H.M. State Farm, Numinbah
	D. G. Neale, "Groveley," Greenmount
	Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
	A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
	W. D. Davis, "Wamba" Stud, Chinchilla
	Queensland Agricultural High School and College, Lawes
	C. K. Roche, Freestone, Warwick
	Mrs. K. Henry, Greenmount
	D. B. Green, "Deloraine" Stud, Durong, Proston
	E. Evans, Wootha, Maleny
	T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
	J. Crookey, "Arolla A.I.S. Stud" Fairview, Allora
	M. F. Power, "Barfield," Kapaldo
	A. H. Webster, "Millievale," Derrymore
	W. H. Sanderson, "Sunlit Farm," Mulgildie
	R. A. and N. K. Shelton, "Vuegon" A.I.S. Stud, Hivesville, via Murgon
	R. R. Radel & Sons, "Happy Valley," Coalstoun Lakes
Ayrshire	L. Holmes, "Benbecula," Yarranlea
	J. N. Scott, "Auchen Eden," Camp Mountain
	"St. Christopher's" and "Iona" Studs, Brookfield road, Brisbane
	E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
	C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
	G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
Friesian	T. F. Dunn, Alanbank, Gleneagle
	C. H. Naumann, "Yarrabine" Stud, Yarraman
	D. J. Pender, "Camelot," Lytton road, Lindum
Guernsey	S. E. G. Macdonald, "Freshfields," Marburg
	C. D. Holmes, "Springview," Yarraman
	A. B. Fletcher, Cossart Vale, Boonah
	W. H. Doss, Degilbo, *via* Biggenden
	A. C. Swendson, Coolabunia, Box 26, Kingaroy
	C. Scott, "Coralgrae," Din Din road, Nanango
	R. J. Wissemann, "Robnea," Headington Hill, Clifton
	G. L. Johnson, "Old Cannindah," Monto
	A. Ruge & Sons, Woowoonga, *via* Biggenden
Jersey	G. Miller, Armagh Guernsey Stud, Armagh, M.S. 428 Grantham
	Queensland Agricultural High School and College, Lawes
	J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
	J. F. Lau, "Rosallen" Jersey Stud, Goombungee
	G. Harley, Hopewell, M.S. 189, Kingaroy
	Toowoomba Mental Hospital, Willowburn
	Farm Home for Boys, Westbrook
	F. J. Cox and Sons, "Rosel" Stud, Crawford, Kingaroy Line
	R. J. Browne, Hill 60, Yangan
	P. J. L. Bygrave, "The Craigan Farm," Aspley
	R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy
	P. H. F. Gregory, "Carlton," Rosevale, *via* Rosewood
	E. A. Matthews, "Yarradale," Yarraman
	A. L. Semgreen, "Tecoma," Coolabunia
	L. E. Meier, "Ardath" Stud, Boonah
	A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk
	W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
	Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango
	F. W. Verrall, "Coleburn," Walloon
	C. Beckingham, Trouts road, Everton Park
	W. E. O. Meier and Son, "Kingsford" Stud, Alberton, *via* Yatala
	G. H. Ralph, "Ryecombe," Ravensbourne
	Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy
	W. and C. E. Tudor, "Boree" Jersey Stud, M.S. 498, Gayndah
	Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman
	D. R. Hutton, "Bellgarth," Cunningham, *via* Warwick
	J. W. Carpenter, Flagstone Creek, Helidon
	H. G. Johnson, "Windsor" Jersey Stud, Beaudesert
	W. S. Kirby, Tinana, Maryborough
	S. A. Crarnb, "Trecarne Stud," Lockyer
	G. & V. Beattie, "Beauvern," Antigua, Maryborough
	J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
	W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
	T. Nock, Dallarnil
	P. Fowler & Sons, "Northlea," Coalstoun Lakes
	F. Porter, Conondale
	H.M. State Farm, Palen Creek
Poll Hereford ..	W. Maller, "Boreview," Pickanjinnie
	J. H. Anderson, "Inverary," Yandilla
	D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick
	E. W. G. McCamley, Eulogie Park, Dululu
	Wilson and McDouall, Calliope Station, Calliope

AGRICULTURE AT THE NATIONAL LEVEL

By ARTHUR F. BELL, Under Secretary, Department of Agriculture and Stock.

The increasing complexity of international trade, and the increasing interdependence of the six States and the Commonwealth of Australia, make it necessary to have a top level co-ordinating body for agriculture.

This has been achieved by setting up an Australian Agricultural Council consisting of two Commonwealth Ministers and the Ministers for Agriculture in the States. The Council is assisted by the Australian Standing Committee on Agriculture, comprising the heads of the six State Departments of Agriculture, C.S.I.R.O., and the Commonwealth Departments of Primary Industry, Trade, Territories, Health, and Treasury.

It is often said that this Council works as Federation was meant to work. Intricate and sometimes vexed questions are debated calmly and in an atmosphere usually free from any party political rancour. It is no small task to reconcile opposing State views on (for example) marketing procedures, but the Council generally manages to do so—as witness the Wheat Stabilisation Scheme.

The last meeting of the Council, held in mid-August, inevitably devoted a deal of attention to the problem of overseas credits and means whereby the volume of exports could be increased. Australia is unfortunately faced with unfavourable "terms of trade"; that is, the price of her exports is falling faster than the price of her imports. Additionally her increasing population requires the importation of increasing quantities of goods such as petrol, rubber, fertilizers, tea, and machines. These two add up to an urgent need for expansion in volume of exports.

In laying stress on the need for increased exports there is some danger of assuming that primary production is standing still. That such is far from being the case was emphasised by the Chairman of the Council (Hon. William McMahon).

For the year 1955-56 the volume of rural production was about 31 per cent. above the pre-war level and the rate of progress is not slowing down. The area sown to improved grass and clover pastures increased by over six million acres between 1952 and 1955; over the same period the area of fertilized pastures increased by 25 per cent. and the number of tractors increased by 30 per cent.

The volume of rural production in 1955-56 was 6 per cent. above the record established in 1954-55. New records were established in the production of wool, milk, beef, and oats, and a near-record in barley.

With recovery in world agriculture, and development of uneconomic agricultural industries in some countries striving for self-sufficiency, marketing has rapidly become Australia's No. 1 problem. To facilitate trade promotion the old Department of Commerce and Agriculture has been divided into the Department of Trade and the Department of Primary Industry. The former will

concentrate on selling Australian produce. Two new phases of activity were reported to the Council:

Firstly, a determined effort is being made to revise the Ottawa Agreement of 1932. Although at that time it was advantageous to Australia to take fixed instead of percentage preferences, conditions have since greatly changed and the Agreement favours Britain much more than Australia.

Secondly, a major publicity campaign has been launched to boost Australian sales in the United Kingdom. The Government and Commodity Boards are jointly spending £400,000 this year.

The United States is still selling surplus farm products at "bargain" prices. Due to over-long retention of wartime incentives and support prices the Government has accumulated stupendous surpluses which it now seeks to unload. Inevitably this has had a disturbing effect on a number of commodities exported from Austraila.

The overall outlook is obviously somewhat mixed. Yet the fact remains that we have continued to sell increasing volumes of exports and the outlook for our only carryover (wheat) is improving. World population is increasing at the rate of 40 millions a year, the United States is at last grappling with the surplus problem, and the United Nations World Economic Survey encourages tempered optimism for 1956-57.

Australian Agricultural Council Meets in Canberra.

Seated: Hon. E. K. Hoar, M.L.A. (Minister for Agriculture, Western Australia); Hon. H. H. Collins, M.L.A. (Minister for Agriculture and Stock, Queensland); Hon. E. H. Graham, M.L.A. (Minister for Agriculture and Food Production, New South Wales); Hon. W. McMahon, M.P., Minister for Primary Industry (Chairman); Hon. G. L. Chandler, M.L.C. (Minister for Agriculture, Victoria); Hon. R. W. Pearson, M.H.A. (Minister for Agriculture, South Australia). Standing: Mr. A. F. Bell (Under Secretary, Queensland Department of Agriculture and Stock); Mr. G. K. Baron-Hay (Director of Agriculture, Western Australian Department of Agriculture); Dr. R. J. Noble (Under Secretary and Director, New South Wales Department of Agriculture); Mr. J. V. Moroney (Secretary, Department of Primary Industry); Hon. C. A. Bramich, M.H.A. (Acting Minister for Agriculture, Tasmania); Mr. W. C. Duggan (Secretary, Australian Agricultural Council).

Culling the Dairy Herd

By S. E. PEGG and C. H. CLARK (Herd Recording Section).

It is a common practice for dairy farmers to cull some cows from their herds each year. In the absence of herd recording, the culling programme can be based only on disease, milking temperament and age.

Information on the productive ability of individual animals must be obtained by herd recording before a reliable guide is available for culling the low producers. Even when production records are known, culling should be carried out cautiously, and factors influencing production records should be considered always.

RATE OF CULLING.

On each farm every year, there may be several factors which influence the rate of culling. Some of these are stocking rate, season, nature of income and expenditure, and availability of replacements which are likely to produce more than the culled animals.

Culling should not be attempted if it is going to reduce the overall income from the farm. When the farm is stocked too heavily, it would be profitable to dispose of some low producers without replacing them. In this case a reduction in numbers would increase the amount of feed available for the remaining cows and should result in increased production.

SELECTING THE CULLS.

The only way to determine the cows which should be selected for culling is by consistently recording the herd for production and, at the end of the year, *dividing the herd into three numerically equal parts according to the milk or butterfat production of individual cows.*

As an example of this let us take a herd which averaged 243 lb. butterfat last year. When divided into three

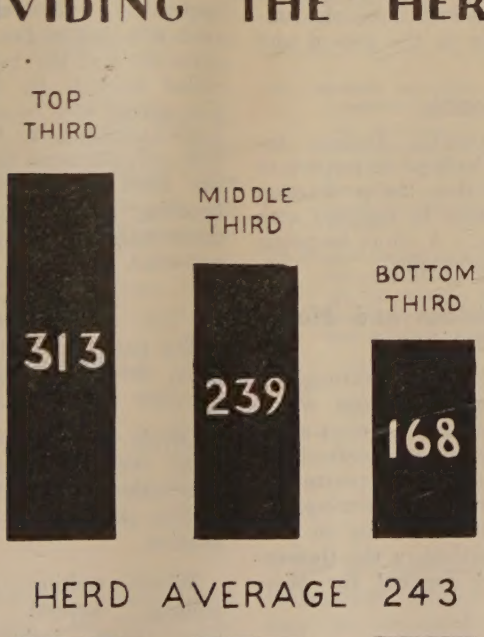

Plate 1.

groups, the average production of each group was:—

	Butterfat.
Top third	313 lb.
Middle third	239 lb.
Lowest third	168 lb.

The variation in the average production of each group is typical of most herds which have been recorded.

When the herd has been divided (see Plate 1), the records of cows in the *lowest production portion* must be examined with reference to the following factors before selections for culling are made:—

(1) Age.
(2) Health.
(3) Seasonal conditions.
(4) Month of calving.
(5) Period between calvings.
(6) Length of dry period.
(7) Treatment prior to calving.

Age.

It is unwise to cull an animal because of low production during her first lactation. She should be given a second chance unless the length of lactation is very short for no apparent reason. One animal may mature later than another, and if she is late in maturing her production could improve considerably in the second and third lactations.

Health.

Records of mastitis, footrot, injury, etc., should be kept in respect of each animal, and then the production for the lactation may be assessed with reference to them. A short lactation may be due to bad health.

Seasonal Conditions and Month of Calving.

When cows are calved throughout the year, seasonal conditions affect some more than others. In most areas increased production is obtained by calving cows in the third quarter of the year. (The results of surveys on the effect of month of calving on production were published in the *Queensland Agricultural Journal* for May, 1955.)

Period Between Calvings.

Preliminary information indicates that the period between calvings should be 12 months or more. When the period between calvings is less than 12 months, the production during the following lactation could be lowered.

Length of Dry Period.

From the results of preliminary surveys, it appears that a cow should be given a dry period of at least eight weeks if maximum production is to be expected during the following lactation.

Treatment Prior to Calving.

Information available indicates that cows produce more milk and butterfat if they are fed well for 2-4 weeks prior to calving. Incorrect comparisons of records may result if all cows are not treated similarly during their dry periods.

When all these factors have been considered in relation to each cow's record, the selected animals in the lowest producing portion of the herd may be culled as opportunities arise.

It must be remembered that the culling of low producers will not raise the standard of production to any appreciable extent unless it is associated with better farm and herd management and the replacement of the culled animals by higher producers. The surest way to obtain satisfactory replacements is to breed them. For this purpose cows in the top third of the herd should be used for the breeding of replacements by mating them with bulls of proven productive potential.

SUMMARY.

The productive ability of individual cows, determined by herd recording, provides a reliable guide for culling.

Divide the herd into three numerically equal parts according to production, and select cows for culling from the lowest producing portion.

When making a selection for culling, several factors which may have influenced the production of cows in the lowest producing portion of the herd must be considered.

Official Test of the McCormick International Super AWD–6 Diesel Tractor by the Australian Tractor Testing Committee

1. THE TESTS.

(1) After 12 hours of running-in, two types of tests were carried out, in order to measure *the performance of the engine,* as measured by the power in the belt driven by the belt pulley, and *the performance of the tractor as a whole,* as measured by drawbar pull, tractor speed, wheel slip, and drawbar horsepower (d.b.h.p.), with the tractor running on a bitumen test track.

The main results of these tests are given in Sections 2, 3, and 4. Other measurements and observations were made of various features of the tractor; these are given in Section 5.

(2) FUEL MIXTURE SETTINGS.—The engine of this tractor has only one fuel-mixture setting, at which all the tests were carried out.

(3) GOVERNOR CONTROL. — The engine was under the control of the governor set to give maximum power and full throttle at rated engine speed.

(4) FUEL.—Distillate, Diesel Index 53, Specific Gravity 0.84; weight per Imperial gallon 8.41 lb.

2. SUMMARY OF POWER OUTPUT.

TABLE A.

—	At the Belt.	At the Drawbar.
Rated engine speed, r.p.m...	1,450	1,450
Corrected maximum power (*a*)	47·6	42·9
Rated power (*b*)	40·5 (*b*1)	32·2 (*b*2)

(*a*) Corrected maximum h.p. is calculated by a suitable formula from observed maximum h.p. corrected to 60° F. and 29·92" (sea level) barometric pressure. No correction is applied to diesel engines because there is no suitable formula; the values shown above are therefore the observed maximum powers.

(*b*) Engines are not expected to run indefinitely at full or maximum power output. But they can be expected to run continuously for some hours at *rated* output, which is less than maximum, defined as follows :—

(*b*1) Rated b.h.p. is defined as 85 per cent. of corrected maximum b.h.p. :

(*b*2) Rated d.b.h.p. is defined as 75 per cent. of corrected maximum d.b.h.p.

3. BELT TESTS.

The belt tests show the power (belt horsepower, b.h.p.) that the tractor may be expected to deliver when driving a machine by the belt.

TABLE B.—BELT TEST RESULTS.

If there is only one fuel setting, no mention will be made of mixture settings in this table.

	B.H.P.	Engine Speed.	Fuel.	
			Gall./ hr. (*c*).	lb./ b.h.p. hr. (*d*)
1. Rated engine speed, 1,450 r.p.m. .. 2. Fast idling speed about 1,580 r.p.m.				
3. Observed maximum b.h.p. at rated speed	47·6	1,449	2·62	0·46
4. Corrected maximum b.h.p. rated speed (*a*)	47·6	No correction made for diesel engines		
5. Calculated rated load (*b*1)	40·5			
6. Test at approximately rated load	40·6	1,484	2·25	0·47
7. Average loading under governor (*e*)	25	1,510	1·7	0·55
8. Equivalent engine torque at full throttle	173 ft. lb. at maximum power and rated speed. 192 ft. lb. (maximum) at 1,050 r.p.m.			
9. Repeat of (3) above after 55 hours	No significant change			

(*c*) Fuel consumption in gallons/hour may be a simple unit, but is has no meaning unless we also quote the corresponding h.p. output.

(*d*) This is the "specific fuel consumption", the weight of fuel consumed per unit of energy developed by the engine; the unit of energy here is the h.p.-hour, similar to the electrical "unit", the kilowatt-hour. When this figure is least the engine is giving its best economy or efficiency. It is easy to change from column (*c*) to column (*d*) in Table B, e.g., as follows:—

2·62 galls./hr. while developing 47·6 h.p. means 2·62 ÷ 47·6 galls./b.h.p./hr. = 0·055 gall./b.h.p./hr.

0·055 gall./b.h.p./hr. × 8·41 lb./ gallon for this fuel = 0·46 lb./b.h.p./hr., as shown in column (*d*).

(*e*) Line 7, Table B., represents the average performance one might expect from the engine while driving a variety of belt loads, from light to heavy. In terms of average fuel consumption, it means about 1⅞ gallons an hour.

4. DRAWBAR TESTS.

(1) The following Tables C, D, and E, show the drawbar performance of the tractor, on the bitumen test track, wearing rear tyres 14 x 30, carrying maximum weight (2,350 lb. front, 6,090 lb. rear; total 8,440 lb.), working in the gears named in the tables. Height of drawbar 16 inches.

Drawbar tests, using standard and minimum weights of tractor, were carried out, but are not reported here.

TABLE C.—MAXIMUM POWER RATED (3rd) GEAR.

	D.B.H.P. (*f*).	Pull lb.	Speed m.p.h.	Wheel Slip % (*g*).
1. Rated engine speed, 1,450 r.p.m. ..				
2. Observed maximum d.b.h.p. at rated engine speed	42·9	3,760	4·28	7
3. Corrected maximum d.b.h.p. at rated engine speed (*a*)	42·9	No correction made for diesel engines.		
4. Calculated rated load (*b*2)	32·2			

TABLE D.—PULL AT MAXIMUM d.b.h.p.

All gears, rated engine speed. See note (*h*).

Gear.	D.B.H.P.	Pull lb.	Speed m.p.h.	Wheel Slip %
1	23	5,900	1·4	17
2	42	4,960	3·2	10
3	43	3,760	4·3	7
4	43	3,060	5·3	6
5	Road speed	not tested		

(*f*) D.B.H.P. is the product of pull (lb.) and speed (m.p.h.) divided by 375.

(*g*) Wheel slip can be measured by noting that, in travelling a given distance, the back wheels make more turns when working under load than when running with no load on the drawbar. The difference in these revolution counts divided by the former count gives the slip as a ratio, which can be written as a percentage (quoted in these tables to the nearest whole number).

(*h*) These are not the maximum pulls available in the gears (i.e., not the maximum sustained pulls), but the pulls at maximum d.b. power, i.e., at full-throttle at rated engine speed.

TABLE E.—FUEL CONSUMPTION, VARIOUS LOADS, RATED (3RD) GEAR.

Pull. lb.	Speed. m.p.h.	D.B.H.P.	Percent. of Maximum d.b.h.p.	Slip. %	Fuel.	
					Gall./ hr.	lb./ d.b.h.p. hr.
1,600	4·73	20	47	3	1·5	0·61
2,100	4·64	26	61	4	1·7	0·55
2,700†	4·53	33†	76†	5	2·0	0·52
3,400	4·40	40	93	7	2·4	0·50

† Approximately the rated drawbar load.

(2) INTERPRETATION OF DRAWBAR TESTS.

(i.) Drawbar tests are carried out on a hard prepared surface. Most field conditions present higher resistance to the tractor's motion, so that, in the field, the maximum drawbar pulls available in any gear will usually be less than those shown in the tables.

(ii.) Wheel slip may also be greater in the field; to that extent tractor speeds in miles per hour in the field will be less than those shown in the tables.

(iii.) Because of (i.) and (ii.) above, the drawbar horsepowers available in any gear in the field will usually be less than those shown in the tables.

5. OTHER OBSERVATIONS.

(1) DURATION OF TEST.—55 hours, including running-in.

(2) REPAIRS AND ADJUSTMENTS.—None.

(3) ENGINE.—

Fuel settings—one only.

Heat controls—radiator, thermostat on water by-pass.

Radiator water used—negligible.

Lubricating oil—type used, S.A.E. 20.

Weight to engine, 14.9 lb.;

Weight from engine after tests, 12.4 lb.

(4) Tractor Weights (lb.)

	Front.	Rear.	Total.
Minimum weight, unballasted	2,170	4,335	6,505
Added weights	80	280	360
*Weight, as usually supplied	2,250	4,615	6,860
Water ballast	..	920	920
Standard weight	2,250	5,535	7,780
Added weight	..	560	560
Water ballast	100	..	100
†Maximum weight, heaviest recommended	2,350	6,090	8,440

* This weight, less driver and fuel, was used in finding centre of gravity.

† Weight of tractor in drawbar tests quoted in this report.

(5) Wheels and Tyres.

Tyres.	Front.	Rear.
Type	Rib	Open centre bar tread
Size	7·50 x 16 x 6 ply	14 x 30 x 6 ply
Pressure	36 psi.	12 psi.

(6) Steering.—With track widths, front and 47 in., rear 55 in. Wheel base 76½ in.

Turning circles: Without brakes, 26 ft. L.H., 25 ft. R.H.; with brakes, 23 ft. L.H., 22 ft. R.H.

Comment: Easy to steer under load, sensitive to steering wheel.

(7) Centre of Gravity, with tractor in standard weight less water ballast and driver.—4½ in. above, 2 ft. 2 in. forward of rear axle.

(8) Driver's Accommodation.—*Access to seat,* from back of tractor. *Foot-room and support,* adequate. *Comfort,* seat flexibly sprung, adjustable fore and aft. *Accessibility to controls,* clutch and brake pedals 23½ in. apart, centre to centre, pedal treads approximately 4 in. below loaded seat. Parking brake latch under right heel awkward to apply. Handling of gear lever in low gear conflicts with left leg.

(9) Instruments.—All clearly visible, band markings adequate. Indications were consistent throughout tests.

(10) Inspection of Engine and Transmission after Test.—After testing, the tractor was partly dismantled and inspected and found to be in a satisfactory condition.

(11) Instruction Books.—Instructions for starting, running, and maintenance were satisfactory.

The Growth Rate of Beef Calves at "Brian Pastures," Central Burnett District

By M. A. BURNS and G. I. ALEXANDER, Cattle Husbandry Branch.

In recent years a number of weighing centres have been set up on beef cattle properties in various parts of the State. With the assistance of the owners of these properties useful information is being obtained on the growth rate of male cattle from weaning until slaughter under the normal management practices on the property. These trials have shown that there is a considerable variation in weaning weights both between properties and between years on the same property.

In order to get some information on the growth rate of calves from birth till weaning, observations are being made on calves dropped at "Brian Pastures," a grazing property of 5,300 acres in the Gayndah district. The

Plate 1.

Identification Tag on Calf.

Plate 2.
Weighing a Calf.

property is situated on the west bank of Barambah Creek approximately eight miles from its junction with the Burnett River. The average rainfall of the district is in the 28-30 in. range, and the pasture consists largely of black spear grass (*Heteropogon contortus*).

The property is owned by the Australian Meat Board, and maintained by the Queensland Department of Agriculture and Stock for beef cattle pasture research.

The Department has a breeding herd of approximately 200 cows of Hereford and Poll Hereford origin, and these are being mated to Poll Hereford bulls. All cattle on the property are weighed monthly in an attempt to measure their seasonal growth on natural pastures, thereby providing a basis on which improved practices can be evaluated. The growth rate of the calves dropped in the 1954-55 calving season is recorded in this article.

METHOD.

Each of the breeder paddocks was ridden over on horseback daily during the calving season. All newborn calves were caught, numbered, weighed

TABLE 1.

AVERAGE BIRTH WEIGHTS AND MONTHLY WEIGHTS UNTIL WEANING.

Sex.	No.	Av. Birth Date.	Weight (Lb.)								
			23 Nov. 1954.	26 Jan. 1955.	24 Feb. 1955.	24 Mar. 1955.	21 Apr. 1955.	26 May 1955.	23 June 1955.	21 July 1955.	25 Aug. 1955.
Male ..	50	1954. 23 Nov.	75	167	209	261	310	359	368	371	373
Female..	45	23 Nov.	67	152	195	235	286	329	338	344	345

and identified with their dams. The season extended over 10 weeks, from November 1, 1954, to January 6, 1955. Subsequent to the initial weighing at birth, all calves were weighed regularly at monthly intervals. Weaning took place on August 25, 1955.

RESULT OF WEIGHINGS.

In all, 50 steer calves and 45 heifer calves were weighed. The birth weights and subsequent monthly weights are shown in Table 1 and presented graphically in Plate 3.

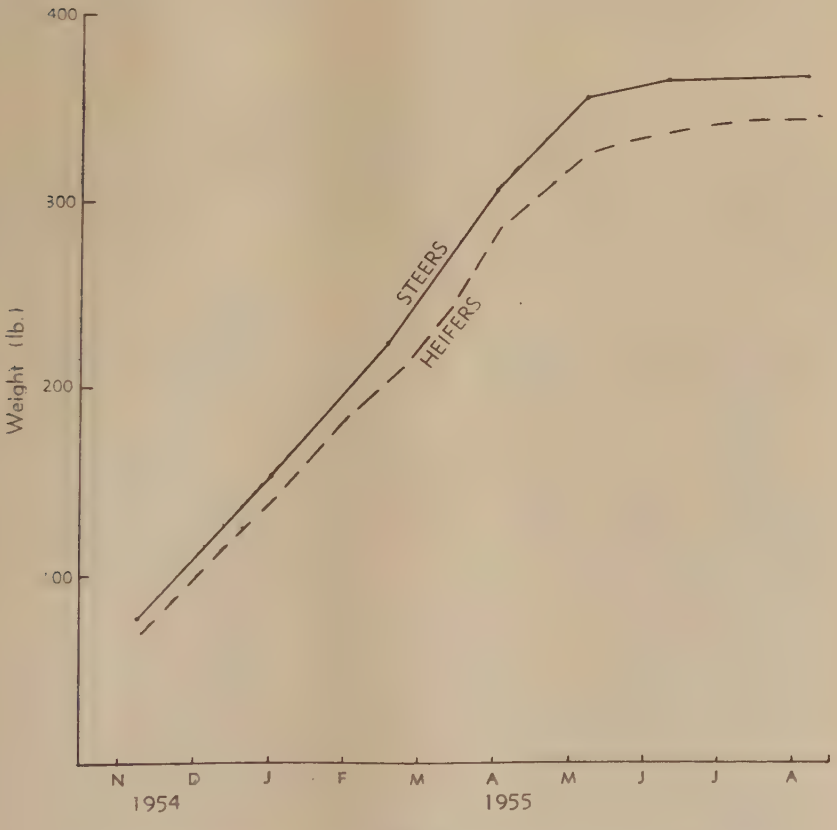

Plate 3.

The Growth Rates of Heifer and Steer Calves from Birth to Weaning.

TABLE 2.

RAINFALL AT "BRIAN PASTURES" DURING THE PERIOD 1–11–54 to 1–9–55.

	1954.		1955.							
	Nov.	Dec.	Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.
Rainfall ... (points)	421	133	75	343	965	417	456	50	184	12

The calves maintained a steady growth rate of the order of 1½ lb. daily until May, when the pastures deteriorated despite the good rainfall (Table 2). After this time the milk supply of the cows apparently diminished rapidly, as the weight gain of the calves decreased in a marked degree.

In a season which was rather more favourable than usual these calves were not finally weaned until nine months old. Nevertheless, they were virtually weaned when six months old as they obviously could have got very little milk from their dams from that time on. One can well imagine how the weaning weights of the calves would be affected by the decline in nutritive value of pastures in a normal or dry season.

THE FERTILE LOCKYER VALLEY.

Information released recently by the District Statistician at Toowoomba for the 880 square miles embraced in the Shires of Gatton and Laidley shows in a striking manner the fertility of the Lockyer Valley.

Here are some of the figures—

	Gatton Shire	Laidley Shire
Total area of rural holdings (acres)	278,349	128,456
Number of rural holdings	666	568
Number with cultivation	612	546
Number with dairy cattle	595	532
Number with pigs	473	374
Wheat for grain (acres)	1,300	1,142
Barley for grain (acres)	56	357
Maize for grain (acres)	1,736	2,808
Sorghum for grain	970	881
Hay crops (acres)	4,546	5,445
Green fodder crops (acres)	11,858	8,337
Orchards (acres)	357	5
Potatoes (acres)	1,942	1,768
Onions (acres)	332	1,691
Pumpkins (acres)	2,418	3,024
Other vegetables (acres)	1,410	1,235
Number of dairy cattle	27,646	18,477
Number of beef cattle	9,119	3,781
Number of sheep	725	1,983
Number of pigs	9,707	6,048

(The above figures were extracted from statistical returns furnished for the 12 months up to March 31, 1955.)

Cattle Slaughtering Facilities in Queensland, With Special Reference to Central Queensland

By A. A. SEAWRIGHT, Veterinary Services Branch.

The operations and activities of the meat industry in Queensland are conveniently separated into three zones of operation which roughly correspond to the three major geographical regions of the State—North Queensland, Central Queensland and South Queensland. Each of these regions contains approximately the same number of cattle (see Table 1) and has its own killing facilities.

Meatworks are designed and constructed to slaughter a certain maximum number of cattle per day, and in practice under normal working conditions this number is readily handled during each full working day. In this report, this number is referred to as the theoretical slaughtering capacity of the works.

TABLE 1.

Beef Cattle Numbers in Various Regions.

Year. (Mar. 31)	North Queensland.	Central Queensland.	South Queensland.
1953	1,837,094	1,845,526	1,695,777
1954	1,944,299	1,992,625	1,766,075
1955	2,046,000	2,028,000	1,775,000

Table 2 lists the existing beef cattle slaughtering facilities in the State, together with the total daily designed slaughtering capacity of each. In the last three columns are given the total daily slaughtering capacity for each region, the annual duration of the slaughtering operations, and the total number of cattle slaughtered in each region in 1954.

Bacon factories are not regarded as effective slaughtering capacity so far as beef cattle are concerned, as they treat mainly cattle of dairy origin and manufacturing quality (that is, canning and smallgoods) and calves. All the bacon factories in Queensland together treat only about 60,000 head of cattle (not including calves) each year.

However, even when adequate cattle are available, interruption to continuous slaughtering from other causes can be expected and in fact over a period of a year's operations the number of cattle treated is usually considerably smaller than the designed capacity of the works. In Queensland meatworks, as a result of these interruptions the average number of cattle killed per day over a season's operations is only about 90 per cent. of the number that could be killed under normal working conditions. This number is referred to as the actual slaughtering capacity.

For example, during April to August of 1955 at Lakes Creek meatworks sufficient staff was employed to slaughter 987 cattle per day.

TABLE 2.

DETAILS OF BEEF CATTLE SLAUGHTERING FACILITIES.

Meatworks.	Theoretical Daily Capacity.	Total Theoretical Capacity for Division.	Slaughtering 1954. Duration of Season.	Number.
			months.	
North Queensland—				
Q.M.E., Ross River, Townsville	564		5–9	177,814
Swifts, Oolbun, Townsville ..	705			
Borthwicks, Merinda, Bowen ..	423	1,692		
*Cairns Meat Export Co., Queerah, Cairns	120	1,812		
Central Queensland—				
C.Q.M.E., Lakes Creek, Rockhampton	1,128			
Swifts, Gladstone	564	1,692	10–11	242,560
South Queensland—				
Q.M.I.B., Cannon Hill, Brisbane	1,269			
Borthwicks, Brisbane	423			
†Associated Canneries, Dinmore, near Ipswich	200			
‡Tancred Bros., Beaudesert ..	141	2,033	12	400,000

* The Cairns Meat Export Co. works at Queerah is only a small works and about 18,000 head are slaughtered each year. Cattle come from the Peninsula and Cairns hinterland and from as far west as the Northern Territory border. The owners of this works have pastoral interests in the north-west and their cattle pass the Townsville meatworks to go to Cairns. Many cattle pass the Cairns works for treatment at Townsville and Bowen. Queerah meatworks operates throughout the year and the company has developed a large local trade.

† Associated Canneries began to operate its new works at Dinmore in July 1955. The figure of 200 per day is considered by the writer to be the maximum daily capacity of this floor.

‡ Tancred Bros. Beaudesert works slaughters about 150 cattle a day, but cattle are treated on three days a week only. The works operate for export from Brisbane and Sydney and for the Sydney domestic market. This company would probably also kill for the Brisbane market if the price were favourable. About 19,000 cattle are treated annually.

During this period an average of only 898 cattle (91 per cent. of the theoretical slaughtering capacity of the staff, 987) was slaughtered daily. (Actually, this works was operating at only 75 per cent. of its designed capacity, which is 1,128 head per day.)

The principal reason for failure to operate to designed capacity when adequate cattle are available is said to be industrial trouble.

Where the term "actual capacity" is used in this report, it refers to 90 per cent. of the "theoretical capacity" of a meatworks.

POSITION IN NORTH QUEENSLAND.

It will be seen from Table 2 that with the two works at Townsville and one at Bowen there exists in North Queensland a total theoretical slaughtering capacity of 1,692 cattle per day. This represents an actual capacity of 1,523 head per day. Based on 22 working days a month, this means that the actual monthly throughput should be 33,506 head. However, only in the months of June, 1953, and June, 1954, were over 30,000 cattle treated in any one month at these works.

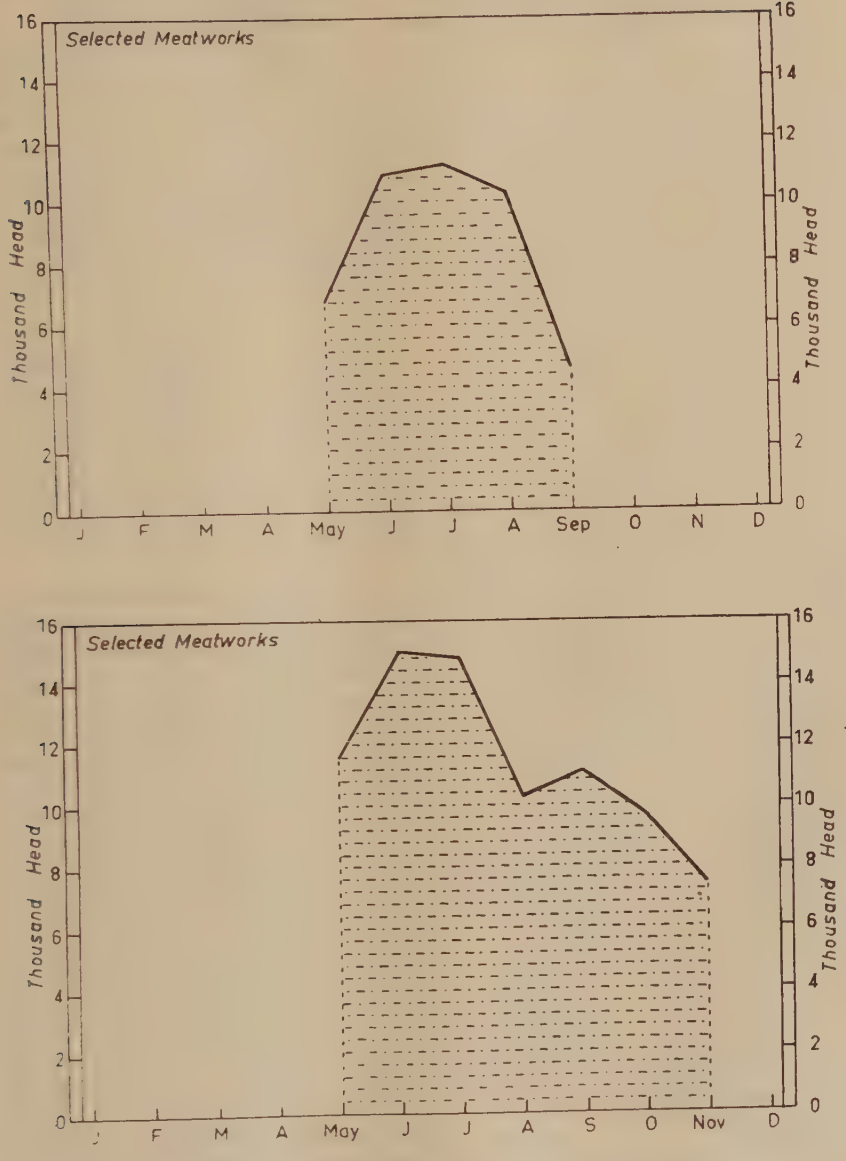

Fig. 1.

Graphs Showing the Monthly Distribution of Slaughterings at Selected Northern Meatworks in 1936 (top) and 1954 (bottom).

Table 2 shows also that the slaughtering operations at the principal meatworks in North Queensland are seasonal. Borthwicks at Merinda and Swifts at Oolbun operate up to 9 months of the year and Q.M.E. at Ross River up to 6 months. Fig. 1 shows the distribution by month of cattle slaughterings at North Queensland meatworks in 1936 and 1954.

These graphs are an indication of the seasonal nature of slaughterings in North Queensland.

It seems that the duration of the season is increasing; however, this may be due to the extended fattening periods of recent favourable seasons.

The climatic factors obtaining in North Queensland are responsible for the seasonal nature of the availability of fat cattle and therefore of meatworks operations. North Queensland can rarely expect effective winter rains in the main beef cattle raising areas. Cattle can be expected to lose weight from the end of May till the beginning of September and the season for meatworks operations is fixed to the period March to October. Large parts of the cattle raising areas of North Queensland can expect only two months of effective summer rain, and the particular period of the summer over which these rains fall will have considerable influence on the duration of the season and the numbers treated. The subcoastal areas of North Queensland can expect four months of effective summer rain in three years out of four, and it is from these areas that the bulk of cattle for the northern meatworks is drawn.

Fat cattle suitable for slaughter are not available in North Queensland over the period November to February. The large northern meatworks must therefore be idle during this period.

It is considered, then, that since these meatworks have not operated to actual capacity during the recent peak seasons and that at present the number of fat cattle suitable for slaughter is dependent entirely on rainfall, which is unreliable in North Queensland, facilities in this region are at present adequate for the needs of the industry.

POSITION IN SOUTH QUEENSLAND.

Referring again to Table 2, it will be noted that at present the two Brisbane works (Q.M.I.B. and Borthwicks) have an aggregate theoretical capacity of 1,692 head per day. Work is now in progress at the Q.M.I.B. Abattoir to extend the slaughtering space to increase the theoretical capacity of that works by 141 head per day.

South Queensland has a theoretical capacity of about 2,000 head per day, and with the expansion of the Brisbane Abattoir facility will have a daily capacity of 2,141 in 1957. These figures do not include slaughterings at South Queensland bacon factories.

While the Brisbane Abattoir has been operating to capacity for the past two years, Borthwicks' works have been below capacity for a long time. The latter works operates a 9-butcher gang and has a monthly theoretical capacity of about 9,000 head of cattle (based on a working month of 22 days). Between 1951 and 1954 it killed 9,000 head of cattle in only two months (June and July, 1954).

The distribution of operations at Borthwicks' works for 1953 and 1954, as shown in Fig. 2, is typical of that of operations at this works. The horizontal line on the graph represents the actual operating capacity of this works. It can be seen that the level of production in even the best years of operations is considerably lower than the potential. Failure to operate at the actual capacity level can be attributed partly to insufficiency of supplies of fat cattle for treatment. Actually, in the peak months of April to August the works does operate at about 90 per cent. of theoretical capacity, which is what might be expected of such a works when adequate supplies of

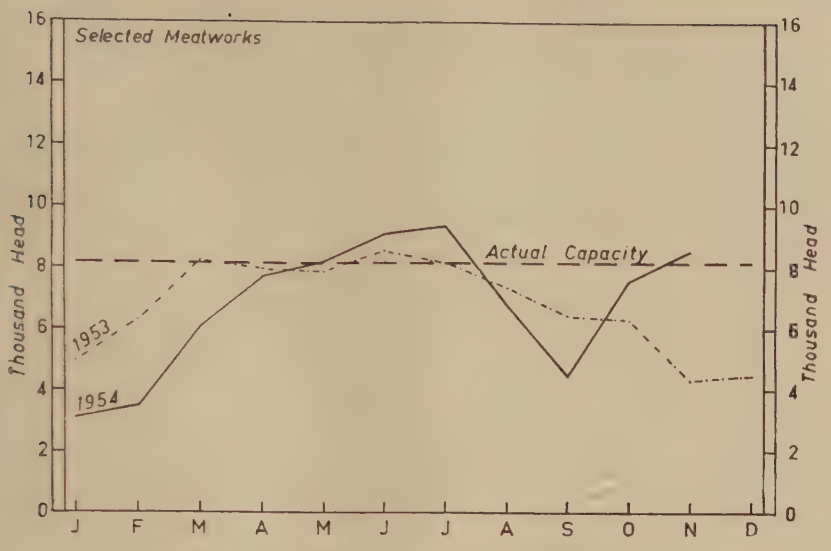

Fig. 2.

Graph Showing Slaughterings at Borthwicks, Brisbane, in 1953 and 1954 in Relation to the Actual Capacity of the Works.

cattle are available. It should be remembered that Borthwicks' works is in the Metropolitan Abattoir Area and in accordance with *"The Abattoirs Acts,* 1930 *to* 1949," cannot slaughter stock for the local trade in this area.

Cattle lose weight during the winter in South Queensland at the same rate as in other areas in Queensland where observations have been made. However, the cattle areas of South Queensland, with the exception of the Channel country, can expect effective summer rains every year and at least two months of effective winter rains in three years out of four. Cattle under these conditions pick up very quickly after winter. This tends to ensure a more continuous supply of fat cattle to South Queensland works than is the case in the northern and central parts of the State.

Since in South Queensland climatic conditions are favourable for fattening cattle over most of the year, production tends to be higher than in the other regions of the State. Of the meatworks operating in South Queensland, only the Brisbane Abattoir operates to capacity over the year. Borthwicks (Brisbane), Associated Canneries (Dinmore) and Tancred Bros. (Beaudesert) have not operated to capacity in recent years. Therefore, it follows that insufficient numbers of fat cattle are available over the whole year. All the meatworks operate to actual capacity in the period April to August, and the Brisbane Abattoir is being extended so that an additional 15,000 head can be treated during this period. It is therefore considered that South Queensland facilities are adequate for present needs and that anticipated future requirements will be met by expansion at the Brisbane Abattoir.

POSITION IN CENTRAL QUEENSLAND.

Central Queensland is served by meatworks at Rockhampton and Gladstone. It is in this area that most claims have been made that there are not sufficient facilities to handle the cattle.

Fig. 3 depicts the aggregate slaughterings of the Lakes Creek and Gladstone meatworks from 1919 to 1955. The trend line shown on the graph has been calculated from the average annual increase in slaughtering numbers at these meatworks of 4,800 head. It can be readily seen from Fig. 4 that over 90 per cent. of the cattle treated are treated in the period March to October. The line on Fig. 3 marked "Estimated capacity" indicates the actual capacity of the works for eight months of operations. Since over 90 per cent. of the cattle are treated over this

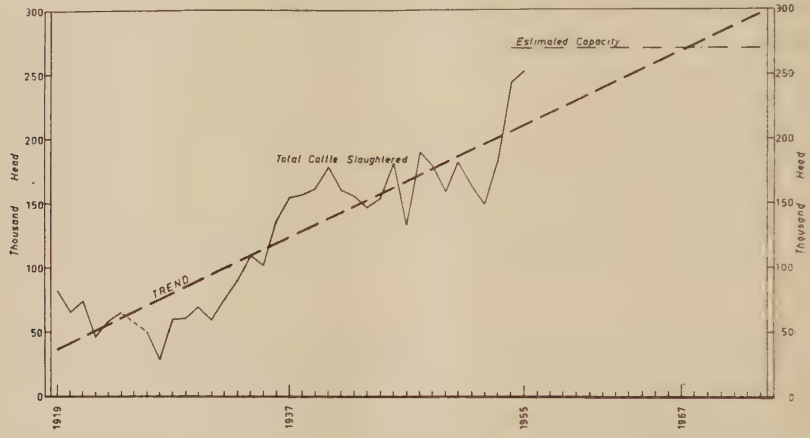

Fig. 3.

Graph Showing Aggregate Slaughterings at Central Queensland Meatworks from 1919 to 1955. The trend line shows that the capacity of the works should be sufficient until 1967.

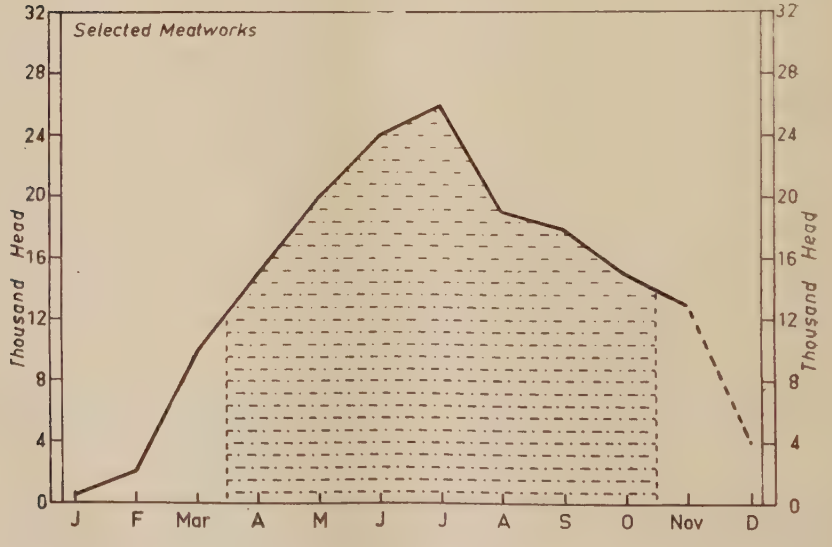

Fig. 4.

Graph Showing How Slaughterings at Central Queensland Meatworks are Concentrated in the Period March to October.

period, eight months can be regarded as the duration of the Central meatworks season. If slaughterings continue to increase at the present rate in this region, then existing facilities should be adequate to handle such increases until 1967.

Existing Facilities.

Fig. 5 shows that the capacities of the Lakes Creek and Gladstone meatworks have continued to expand over the past 30 years and at a very rapid rate in recent years. Lakes Creek is now equipped to treat 1,128 head and the Gladstone works 564 per day, representing an increase of 20 per cent. in slaughtering capacity of these Central Queensland works on the aggregate capacity at the beginning of 1954. In the same period the number of cattle treated has increased by about 10 per cent. The fact that these companies have increased their capacities shows they are optimistic about the future of the cattle industry in this region.

troubles and the remaining 15 per cent. to cattle not being received for slaughter at the works. During 1955 Lakes Creek was not able to operate to theoretical capacity because insufficient cattle were available at the price offered by the works. Lakes Creek kills only about 10 per cent. of the cattle on a weight-and-grade basis. Its general policy on prices results in a long killing season.

Season and Weight Loss.

During the last three years, the Department of Agriculture and Stock has been carrying out regular weighings of cattle in the coastal areas of Central Queensland to measure losses in weight during the winter. The longest period of weight loss so far recorded is 111 days for growing steers in the Gayndah district in 1954, a season which was regarded as average. For the period of 111 days, the average daily weight loss was 0.73 lb.

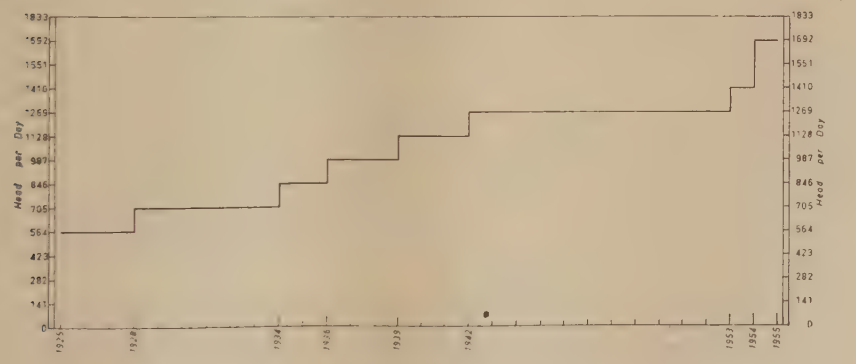

Fig. 5.

Graph Showing Theoretical Daily Slaughtering Capacity of the Central Queensland Meatworks from 1925 to 1955. The expansion in capacity is clear.

Slaughterings in 1954 in Central Queensland were 30 per cent. higher than in 1953. However, at the peak of the killing season of 1955, Lakes Creek was operating at only 75 per cent. of its theoretical capacity. Probably 10 per cent. of the deficiency could be attributed to industrial

At the same centre in 1955, which was a better-than-average year, growing steers lost weight for only 47 days at an average daily rate of 0.59 lb.

It is most desirable to market cattle as three and four-year-olds. Four-year-old cattle are still growing

and a weight loss of the order of 0.73 lb. per day for 111 days in an average season can be expected in such cattle in areas experiencing conditions similar to those at Gayndah.

It is not possible to make an accurate estimate of weight losses on pasture for all cattle in the Central region. It is stated by graziers, however, that weight losses of the magnitude of 0.73 lb. per day for 111 days do not occur with tableland or western cattle because pastures are more nutritious, and that consequently cattle can be held in these areas with less weight loss. This view has not been examined by critical measurement. It should be remembered, however, that at slaughter western cattle are usually older than coastal cattle and they are marketed later in the year.

Weight Losses and Savings.

During 1955, a total of 252,266 cattle was slaughtered at the two large Central Queensland meatworks. The combined theoretical daily capacity of these two meatworks is 1,692 head, representing an actual average daily capacity of 1,523 head. In order to slaughter 252,266 cattle at the rate of 1,523 per day, 165 days (7½ months) of continuous operation would be necessary. It can be assumed that the season begins early in March and that no weight losses occur in cattle up to the end of May. From information submitted by the management of the Lakes Creek meatworks it is known that 30,267 cattle originating in coastal areas were killed in Central Queensland during the period of 111 days following the end of May during which cattle are considered to lose weight. The average period of weight loss for these cattle would be 56 days. If the daily weight loss per head is taken as 0.73 lb., the total liveweight loss for coastal cattle during the period would be 30,267 x 56 x 0.73 lb., which equals approximately 1,200,000 lb. Since a 55 per cent. yield can be expected from this class of cattle, the loss in carcase weight would be approximately 642,000 lb. This, on values paid in Central Queensland last year (namely 120s. per 100 lb. dressed weight) would result in a monetary loss in the vicinity of £40,000.

If all cattle killed in Central Queensland on the 80 working days of the 111-day weight-loss period were taken into account, they would number about 122,000. If they all lost weight at the same rate as estimated above, there would be a total liveweight loss of 5,000,000 lb. and a monetary loss of £160,000.

The above information has been calculated on the assumption that fat cattle lose weight at the same rate as growing cattle, the only animals from which details of weight gains and losses are available.

Shortening the Season.

It can be deduced from the trend line in Fig. 4 that if the two Central Queensland meatworks killed to capacity for a period of six months they could not slaughter all the cattle that are offering throughout the season. Only 200,000 head could be slaughtered in six months, whereas 250,000 were slaughtered in 1955. However, had 1955 been an average year the number submitted could have been handled in six months.

If the season were shortened to a period of six months, finishing at the end of August, all coastal cattle, and perhaps all cattle killed after the end of May, would sustain weight losses. Should the six months' season be so organised that half the coastal cattle are treated after the end of May, then at least 28 per cent. (calculated from C.Q.M.E. information) of all cattle treated (or 70,000 head) would lose weight.

With the present season of eight months or longer in Central Queensland, cattle which have lost weight

during the winter and which are not slaughtered until November and December are given a chance to restore what weight they might have lost during the winter.

It is considered that the reduction of the season to six months in Central Queensland is unlikely to have any effect in reducing winter weight losses. It is therefore better to have a season extending over eight months or longer. On this basis the Central Queensland slaughtering capacity will be adequate until 1967 to slaughter all cattle offering.

Prices and Competition.

Some southern operators buy in Central Queensland in the spring, when Cannon Hill prices are high enough to enable them to rail cattle to Brisbane for less than the price difference in the respective areas.

Local prices are dependent on export prices and until the advent of trader-to-trader operations export meat prices have been higher than local prices. When the export price becomes steady, the local price falls slightly below it. For mixed operators at Cannon Hill on a quota system, the price they will be able to pay falls between the local and the export prices. Export operators are then in a very good position to compete with such mixed operators.

If a public abattoir were established in Central Queensland the activities of the operators would be almost entirely in the export field. Therefore, some contend, competition would force all operators to pay the export price, not the one intermediate between local and export, and the result would be a higher price to the producer.

However, no reliable estimate of the killing charges at a new public abattoir could be determined until the works was ready to operate. The charges could be such that the power of new operators using the facility to compete with the existing meatworks companies might be diminished, and the overhead increased to a level that would make it difficult for them to keep up their killing quotas at the public abattoir. The kill at the public abattoir would then be reduced and the overhead increased, until the stage was reached whereby it would not be possible for operators using the abattoir to buy in the area. This situation could easily arise without the existing companies making any active endeavour to keep such operators out of the cattle market.

It is considered, then, that increased competition would bring a better price to the producers, but only if the public abattoir overhead could be kept to a level corresponding to that of the existing meatworks in the area.

SUMMARY.

(1) At present there are adequate killing facilities in North Queensland, Central Queensland and South Queensland.

(2) In the years 1953 and 1954 the two Brisbane works (Brisbane Abattoir and Borthwicks Moreton Freezing Works) worked to over 90 per cent. of designed capacity for the flush of the cattle season. Since this is the order of efficiency to be expected from large meatworks, it could be said that more capacity was needed in South Queensland. This extra capacity will be supplied by the provision for the 30-butcher gang at the Brisbane Abattoir and the operation of the Dinmore meatworks.

(3) In 1954, the Lakes Creek works in Central Queensland operated overtime to kill available cattle in the flush of the season and therefore killed to better than 90 per cent. of designed capacity during this period. Lakes Creek and Gladstone have both increased their capacities, and in 1955 Lakes Creek's capacity in

the peak killing months was used to only 75 per cent. of that designed, even though a record number of cattle was treated in Central Queensland this year.

(4) The North Queensland season is very short and the existing meatworks can easily handle the available cattle at all times.

(5) The positions in North and Central Queensland arise not so much from actual shortage of slaughtering capacity as from the unsatisfactory nature of the marketing of the cattle. In these areas certain meat companies operating meatworks enjoy a virtual monopoly in the flush of the season. The producers contend that such meat companies can afford to pay more for their cattle.

(6) The three years 1953 to 1955 were very favourable to the pastoral industry, resulting in above-average turnoff of killable cattle. Nevertheless, meatworks in all areas, and in particular in Central Queensland, the most difficult area, have increased facilities to handle all available cattle within a reasonable period. Consequently, it is considered they should be in a sound position to handle an average season's turnoff.

(7) Available evidence and expressed opinions of qualified officers of the Departments of Public Lands and Agriculture and Stock indicate that the cattle industry of Central Queensland in particular should continue to expand. This may arise from property improvement, improved animal husbandry and agricultural methods and the tendency to market stock at a younger age for the yearling beef and the chilled beef export trades. Existing facilities have kept pace with available cattle and should continue to do so in the immediate future.

NOTICE TO SCHOOLS.

To prevent wasteful distribution of the Journal, it is intended to withdraw from the free list all State Schools which do not have an active agricultural project club. Please inform the Department if your project club is still active. The subscription rate to State Schools without active project clubs is one shilling a year.

VOL. III. OF THE "QUEENSLAND AGRICULTURAL AND PASTORAL HANDBOOK."

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A New Approach to Blowfly Strike

By G. R. MOULE and J. R. M. WOLFE, Sheep and Wool Branch.

It is now possible TO PREVENT A FLYWAVE. Your effort to do this is not enough. Your neighbours, and in fact all Queensland's woolgrowers, need to work with you in a well-thought-out plan.

Without doubt we all need a new approach to the prevention and control of flystrike. In the "old days," woolgrowers were concerned only with the control of blowfly strike. Scientists investigating the problem took the same approach. Their first concern was for something that would stop the sufferings of struck sheep and prevent them from being struck again. Year after year new and better hand dressings were developed.

Flystrike was first recorded in Australia in 1883. It was not until the early 1930's that research was co-ordinated in a national effort. By 1941—only 10 years after combined research had begun—reasonably effective means of preventing flystrike had been developed.

Basic work on the habits of blowflies, breeding grounds, the seasons that favoured them most, and the conditions under which different species attacked sheep, had to be undertaken. It was only when the answers to these questions were known that a plan could be formulated to prevent and control flystrike.

Did all woolgrowers use the preventive measures that research had found? Unfortunately, no! Some felt they had "learned to live" with blowfly strike. It caused some loss, they considered, but nothing serious, provided they followed the normal procedure of mid-season crutching and hand dressing. Others had learnt to depend on one or another of the various methods of prevention. These included three or more crutchings a year, or jetting regularly with arsenic right through those seasons when blowflies were active. In that case, why should a new approach to the prevention of blowfly strike be developed?

Losses Caused by Blowflies.

Have you ever stopped to consider how much blowfly strike contributes to the cost of running your property? Reckon it up in these terms:—

(1) The loss of wool—struck sheep may cut 1 lb. of wool less than unstruck sheep.

(2) The loss in price—struck sheep tend to produce tender fleeces. This reduces the price per pound.

(3) Blowfly strike reduces lamb-marking percentages — sometimes by as much as 20 per cent.

(4) Blowfly strike increases death rates in unprotected flocks.

(5) The combination of lowered lamb-marking percentages and increased death rates reduces the amount of culling that can be done. This means you may have to keep unprofitable sheep.

(6) The cost of treatment and prevention of fly strike.

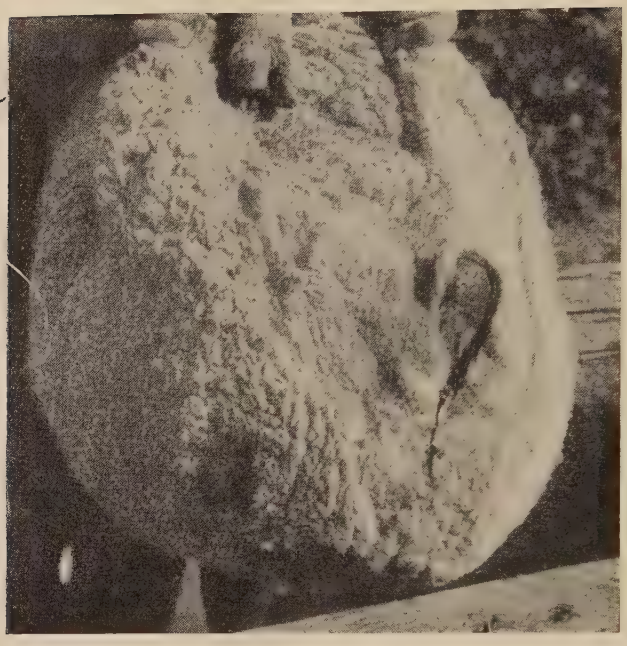

Plate 1.

The Tail Strip Operation Performed on a Weaner.

Plate 2.

Performing the Mules Operation Using a Cradle Mounted on a Raised Shearing Shed Floor.

When you put a cash value on all these factors, you will realise blowfly strike is a constant source of financial loss. Worse still, it is a constant source of worry. You don't know when there is "another wave just around the corner." On many properties there are inadequate labour and equipment to handle the flock if a flywave develops. While these conditions remain, more flywaves are inevitable!

How Flywave Starts.

The blowflies that start strikes breed in struck sheep. The blowflies that start strikes breed quickly. They may produce a complete new generation in 14-17 days. Some species can produce a five-hundredfold increase per generation!

First a few sheep get struck. You may not notice them or the weather may prevent you from handling your flock. Blowfly populations quickly increase from the few strikes that seem unimportant—within a few weeks you have a flywave on your hands. If you keep ahead of the flies you can prevent the wave.

Treat your sheep when the weather is warm and moist and a few strikes are occurring. Obviously it is not enough for you to be the only one to adopt preventive measures. If most woolgrowers in your district act together, as they did earlier this year, it is possible to avert a serious flywave. Robbed of its breeding ground, the fly that causes strike does not get an opportunity to increase its numbers. *No major flywave develops.*

Plate 3.

The Stretched Bare Area on a Lamb One Month After the Mules Operation.

Plate 4.

Shower Dips are Suitable for Quick Control of Body Strike.

(Photo by courtesy of Sunbeam Corporation.)

The question which remains to be answered is, What is the best method to prevent blowfly strike in sheep?

Preventing Blowfly Strike.

There is no single method of preventing blowfly strike successfully. You will get best results from working to a co-ordinated plan. Remember these four points:—

(1) At marking time cut the tails of the ewe lambs so they are level with the tip of the vulva.

(2) Perform the Mules and tail strip operations on ewe weaners soon after the first shearing.

(3) A mid-season crutching will see you through most years.

(4) With the aid of the new insecticides and a good jetting plant or a shower dip, you can keep your flock free of strike for several weeks.

Most people have heard of the "new insecticides." DDT and BHC received a good deal of publicity after World War II. Recently, aldrin and dieldrin have become more popular. All four of these substances belong to the same "chemical family." Diazinon is the latest arrival in the field, but comes from a different chemical group. Diazinon is a phosphate compound that is also effective against blowfly maggots.

Most important of all, aldrin, dieldrin and diazinon make hand dressing unnecessary. They can all be jetted on to strikes. Provided the pressure is not excessive, they will not injure sheep, but they will quickly kill the maggots and clear up the strike. This treatment will also prevent restrike.

To be most effective, these insecticides have to be applied properly. Best results will be obtained by wetting the wool to the skin. This can be done conveniently by using a jetting plant or a shower dip.

Plate 5.

Sheep Under the Top Showers.

(Photo by courtesy of Sunbeam Corporation.)

But for how long will aldrin, dieldrin or diazinon protect your sheep against flystrike? Trials conducted at the Toorak Field Station, Julia Creek, during the last two years have shown that when jetted into the wool so that it is saturated to the skin, dieldrin and diazinon at 0.05 per cent. concentration will give almost complete protection against crutch strike for from 4 to 7 weeks to plain-breeched, uncrutched, unmulesed ewe weaners. An 0.1 per cent. solution of aldrin will give comparable protection.

Aldrin, dieldrin and diazinon did not always give long protection against breech strike. Some wrinkly-breeched sheep were struck quite soon after treatment when the flies were active.

When applied as a tip spray, 0.05 per cent. dieldrin did not protect sheep as well as arsenic jetted to the skin. You can see it is essential, therefore, to wet sheep right to the skin with aldrin, dieldrin and diazinon for the best protection.

Uncrutched weaners that have not been treated with the Mules operation are the sheep most likely to be struck. That is why they were selected for this experiment. They may have remained completely free of strike during the whole of the wave had they been treated with the Mules operation, in addition to the application of insecticides.

It has already been shown that aldrin and dieldrin will protect sheep effectively against body strike. Once again best results will be obtained by saturating the wool to the skin. It may be necessary to treat large numbers of sheep quickly. This demands the use of a modern jetting plant or a shower dip.

The advantages of jetting are:—

(1) Its economy—with a jetting plant you can wet the wool to the skin on those spots most likely to be struck.

(2) If the jetting is done expertly only small amounts of fluid are wasted.

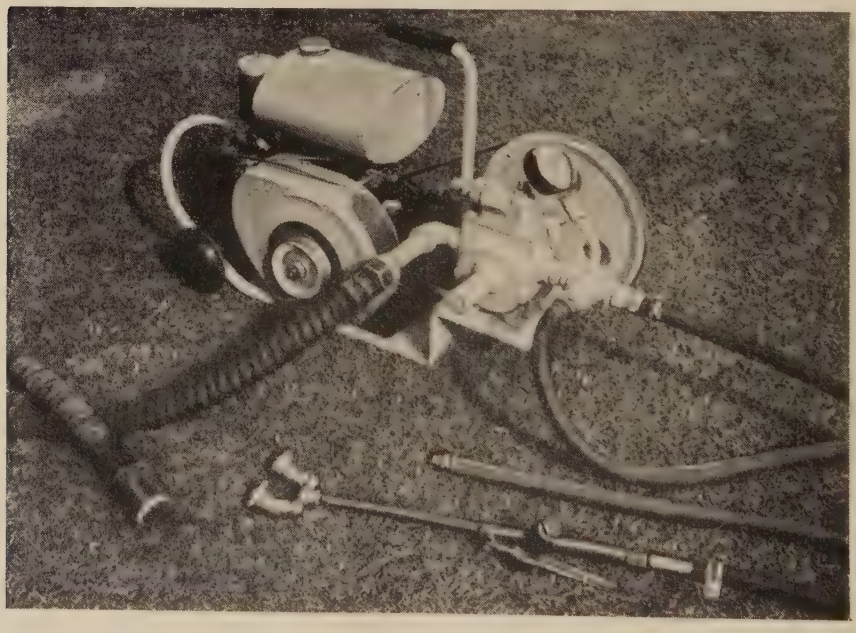

Plate 6.

Small Portable Jetting Plant Which Can be Used for Other Jobs on the Property.

(Photo by courtesy of Sunbeam Corporation.)

(3) Jetting with aldrin, dieldrin, or diazinon is the easiest way of treating struck sheep. You do not have to shear the wool away from the strike; the insecticide will stop restrike.

The main advantage of using a shower dip is the rapidity with which the sheep can be treated. However, it is harder to ensure the fleece is wet to the skin if the sheep are carrying more than four months' wool. Fluid is sprayed on places that don't matter as well as those that do!

It is well to bear in mind that stripping occurs when using certain chemicals in shower dips. Stripping is the loss of active ingredient from the dipping fluid. The ability of an insecticide to strip is an advantage. It means the active ingredient adheres to the wool, thereby giving better protection against flystrike. All you have to do is add concentrate in accordance with the manufacturer's recommendation to be sure the strength of the fluid is maintained.

Plate 7.

Jetting a Strip Six Inches Wide Along the Back to Prevent Body Strike.

(Photo by courtesy of Sunbeam Corporation.)

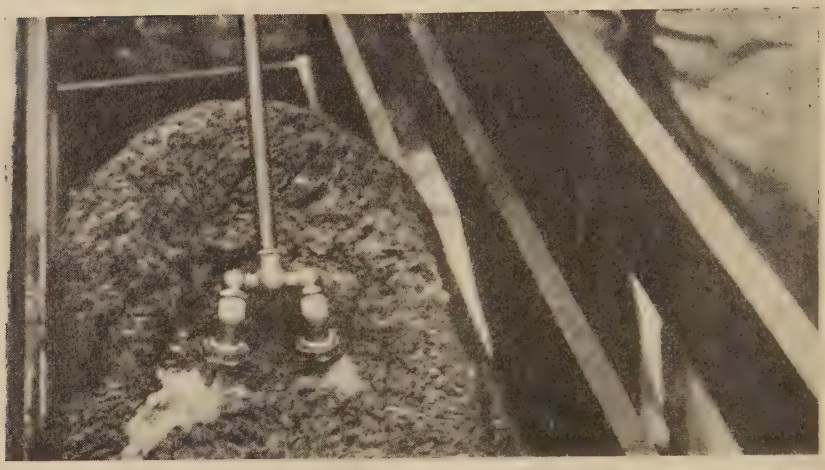

Plate 8.

Close-up of Jetting Nozzles Which Will Deliver a Fine Spray at a High Pressure.

(Photo by courtesy of Sunbeam Corporation.)

Summing Up.

(1) It is possible for woolgrowers to prevent a flywave if they all protect their sheep from flystrike.

(2) The best plan for protection is:—

(a) Tail correctly.

(b) Perform the Mules and tail strip operations.

(c) Do a mid-season crutching.

(d) Apply aldrin, dieldrin or diazinon to wet the wool to the skin if you think a flywave is imminent, or if the weather is warm and a few strikes are occurring.

Remember, it's what YOU AND YOUR NEIGHBOURS do that counts.

GETTING RID OF GREEN CESTRUM.

This yellow-flowered shrub is a persistent weed around towns in southern Queensland and sometimes causes poisoning of stock. In the past it has been very difficult to eradicate, as if cut down it shoots again from the rootstock and for every stem broken from the rootstock in attempting to pull the plant up, two or three more will grow.

The Government Botanist (Mr. S. L. Everist) states that the best means of control is to cut the plant close to the ground and spray the freshly cut stems with 2,4,5-T at a strength of 1 per cent. This strength is five times as strong as that generally used for spraying weeds. Don't use a mixture of 2,4,5-T and 2,4-D — straight 2,4,5-T is required.

This treatment kills most of the plants, roots and all, and the few new shoots that do come up can be killed with a second treatment.

Training the Young Sheep Dog

By W. GIBSON (in an A.B.C. talk).

You must have seen sheep dogs at shows displaying amazing intelligence in yarding a few cunning old wethers. You can have a dog almost as good as these if you train it in the right way.

A puppy from a good line of working sheep dogs doesn't cost so much as prices go today. The prospective owner will find that the right type of pup, properly trained, will become a real asset to him.

Before he becomes the owner of a pup he should ask himself, "Have I got the ability and patience to train this dog?" If he decides he hasn't—well, I'd say, "Buy a trained dog." The reason I say this is that, during the dog's training, the owner must be calm, be reasonable and above all things be able to control his temper; otherwise how can he expect to control a dog if he cannot control himself? After all, these dogs have been trained to work sheep down through the ages and very often the dog may know more about working sheep than the person trying to train him.

In this talk I don't propose to touch on the finer points in the training of the trial dog, but merely to give a few hints on the training of a good serviceable dog suitable for station or farm work—a dog any sheepman will be proud to own.

Not so many years ago in Scotland, as many of you may know, the penalty for sheep stealing was death by hanging and in every case the dog was hanged with the owner. Now this does not show the Scotsman of that time as a cruel and heartless people, but rather that the court placed the intelligence of the dog on the same plane with that of man. The dog, here, was the actual thief working under instruction from his master, who may have been miles away at the time.

Now the puppy selected should, when weaned, be kept away from other dogs, say, in a little pen in the shade with a dry waterproof kennel to crawl into. During these early stages he should be attended only by the person who is going to train him. Let's suppose today that you are this person. How are you going to train your puppy?

When he is still in the puppy stage you should quietly but firmly teach him little commands—remember, harsh treatment may spoil him for life.

When he reaches the age of 4-6 months you should take him out for a walk on a moderately long lead and teach him to "come behind" and stay there, by giving him the command and using the lead to guide him. Allow him to stray on the lead and then tell him to come behind and so on, always using the lead as a guide. Once again, "no harsh treatment"—the point to remember at this stage is that the dog must gain full confidence in you if you are to become a team.

When the dog has learned this with confidence (I may remark here that confidence is the key to success, not fear, as some owners are inclined to think) he is ready to be taught the commands "sit down" and "stay there."

I would like to point out here that there is no hard and fast rule in teaching these commands. A dog is an individual just as a person is, and a method of teaching these commands may be successful with one and not with another.

For instance, the bold type of dog may learn the commands quickly and just as quickly forget them. He must be shown that carelessness in a sheep dog won't be tolerated.

Then there is the nervous type—a highly strung dog. This dog requires very careful handling. He is slow to learn and must be allowed time to think out the commands for himself before he will execute them. With careful handling this type of dog will become an excellent paddock dog.

The command to "sit down" is easily taught, simply by issuing the command and pressing down the dog's back until he sits or crouches. The lesson should be of short duration at first and continued until he has thoroughly learned it.

You will find the next command, "stay there", more difficult to teach. When you place the young dog in the sit-down position, walk away a few paces and issue the command "stay there," see that he doesn't move. When these commands are being taught the dog should never be off the lead. As the training goes on, increase your distance from the dog until you arrive at the end of the lead, which should be moderately long. You will find obedience to this command will take a few weeks to acquire. If the dog is inclined to follow you, have a sheet of newspaper rolled up or a little twig with a few leaves on it. A light slap with one of these is very effective.

I cannot stress too strongly that you be calm and retain your temper during the whole course of training; any pain from a beating will destroy the puppy's confidence in you and definitely ruin him.

When the young dog has learned those two commands the lead may be discarded and a test made to find out if the dog thoroughly understands the commands issued. If not, use the lead again. This time the commands "sit" and "stay there" should be accompanied by tying the dog up short to a peg driven in the ground so he can't move away. Now gradually increase the distance between you until he sits there quite calmly. If he persists in moving, a few slaps with the leafy twig or newspaper should have the desired effect. Occasionally you strike a bold, strong-willed dog. If so, I would say to the sheepman, discard him, as no amount of training will make him a really good paddock dog. He may be useful as a drover's dog or for the sheepyards.

Next you should mount a quiet pony and take the young dog out, issuing the commands from the saddle. Get him used to following the pony close up. Make him sit down—ride a short distance away, call him and when he gets about half-way stop him and make him sit down again. After a few seconds call him behind you and move off. Keep this procedure up daily until he has become completely obedient.

Now remember that during all this period of training the dog has not been shown sheep—yet more than half his training is over. At this time the dog should be about 8 months old. Now take him out in the home paddock where the killers are and show him the sheep. Don't take any other dog with you.

If your dog is from a good line of sheep dogs his instinct will come to the surface. He may be bewildered at first and not do anything, but leave him alone and see what he does "off his own bat." If he does nothing, steady the sheep with your horse and make the dog sit down, then ride around to the opposite side of the flock. Stop there, let the dog survey things so he can form a picture in his mind. Then call him, making him come around the sheep. When he gets half-way, stop him and make him stay there, move round opposite the dog again and make him come round half-way and stop him again. Keep this up until he gets the idea that the sheep must be between himself and you. If he makes a mess of things by running through the flock or cutting a few off, don't chastise him; just call him behind and go home. Next day when you see him he will try and let you know he would like to see those sheep again.

The most important part of training the sheep dog has been completed; the rest will come to the dog himself. Get him used to casting away from either the right or left hand sides, and so long as you have perfect control over the dog you will be able to make him do anything you wish with sheep. No matter how many dogs are there he will only do what you command, and if left to himself you may be sure he will do the right thing.

Now a final point on teaching the young dog to cast away from you from either side. You will readily realise that you have already taught him this back to front. Now with the dog behind you give him the command to "get away there," pointing with either arm, depending on which side you want him to cast. The first thing he will think of will be to get to the other side as quickly as possible so that the sheep will be between himself and you. Naturally, when he gets there the sheep will turn and run towards you. Stop him and teach him to follow the sheep steadily and at a distance. When they stop make him stop too, then teach him to approach the flock in a slow steady manner.

Now that you have a sheep dog, practice will make perfection. After he has had a fair amount of practical work close at hand you will find that when mustering in the paddocks he will take wider casts and approach sheep in a more scientific manner, causing them as little inconvenience as possible. He will also scent the air for sheep and let you know by his actions that there are sheep in such and such a direction, although they might be out of sight.

Finally, I would say to the sheepman, "Make a mate of your dog, as he will be the best and most faithful friend you are likely to possess."

The Honey Flora of South-eastern Queensland

By S. T. BLAKE (Botanist) and C. ROFF (Adviser in Apiculture), Science Branch.

(*Continued from page 496 of the August issue.*)

Golden Candlesticks.

Botanical Name.—*Banksia collina* R.Br.

Distinguishing Features.—A shrub with branches in clusters, narrow leaves whitish beneath, and long thick rich yellow flower-spikes from the centre of the clusters of the older branches (Plates 160-161).

Description.—This is a shrub usually 3-6 ft. high but sometimes taller, with clustered branches and branchlets. The leaves are green and somewhat shining above and nearly white underneath, with very short stalks and usually some sharp teeth along the margins, very narrow, about 1½-4 in. long and ⅛-$\frac{3}{16}$ in. wide. The flowers are borne in thick dense orange yellow spikes about 4-8 in. long and 3-3½ in. wide which arise from the centre of the older branch-clusters; there are four "petals," each with an anther seated in a little depression at the end. The style is very long and slender, usually yellow but sometimes red or purple or even bluish black.

Distribution.—On stony or sandy hills, chiefly in forest country in the Moreton and Wide Bay Districts, sometimes abundant, less commonly in the Darling Downs District. Also in the Port Curtis and Leichhardt Districts, coastal New South Wales, and Victoria.

Usual Flowering Time.—March-November.

Colour of Honey.—Dark amber.

Importance as Source of Honey.—Minor.

Importance as Source of Pollen.—Minor.

General Remarks.—This shrub yields nectar and pollen which is utilised as beefood.

The poor quality honey is strongly flavoured and has weak density.

Plate 160.

Golden Candlesticks (Banksia collina). Leaves and spike of flower buds.

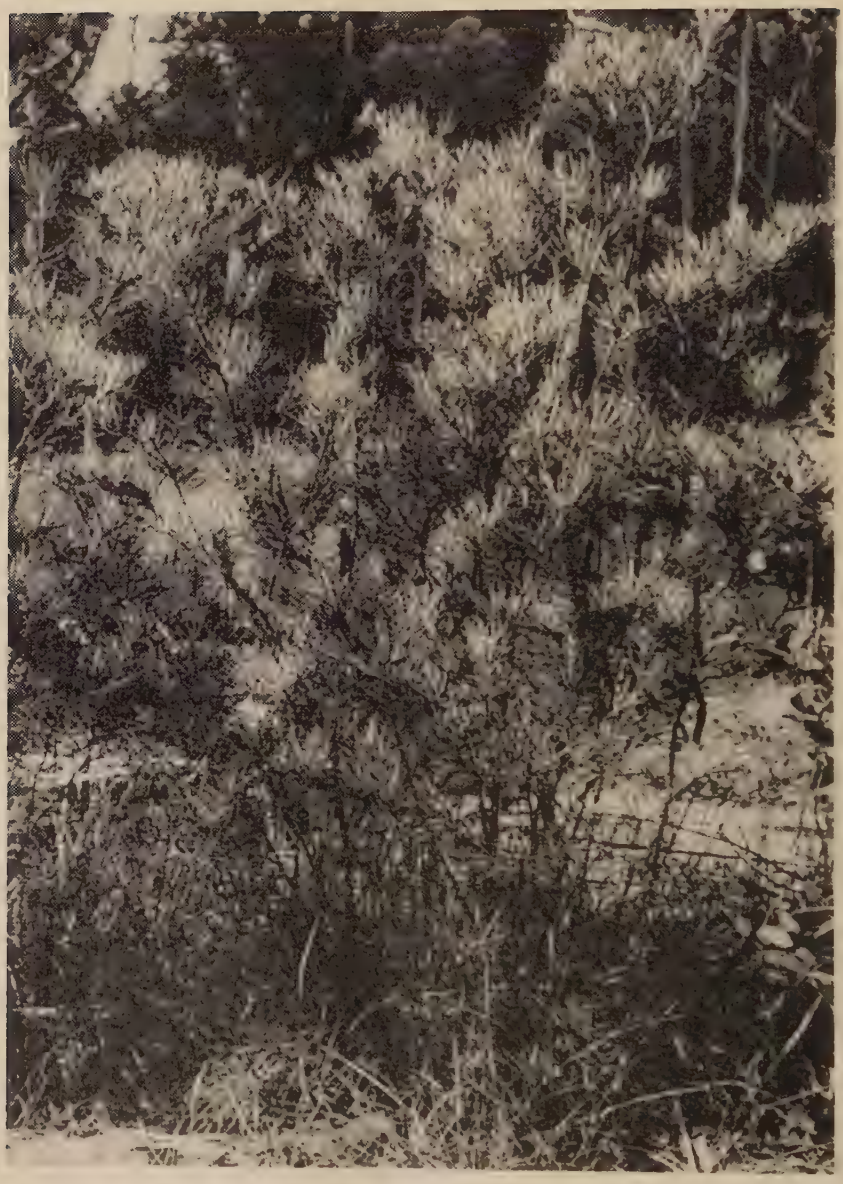

Plate 161.

Golden Candlesticks (Banksia collina). Beerburrum.

Broad-leaved Banksia.

Botanical Name.—Banksia robur Cav.

Other Botanical Name.—Banksia latifolia R. Br.

Distinguishing Features.—A low shrub with stiff large serrate leaves that are whitish underneath and long thick dense spikes of green to greenish yellow flowers (Plates 162-163).

Plate 162.

Broad-leaved Banksia (Banksia robur). Leaves with spike of flower buds.

Description.—This is a shrub up to about 4 ft. high. The leaves are very stiff and blunt, tapering at the base into stout stalks, with serrate edges, about 6-12 in. long and 2-4 in. wide, whitish underneath between the yellowish veins. The flowers are densely packed into thick erect spikes about 3-7 in. long and 3-3½ in. wide at or near the ends of the branches; they are green in bud, greenish yellow when open. There are four "petals," each with an anther seated in a little depression at the end and a very long slender style.

Distribution.—Swampy ground in the Moreton and Wide Bay Districts, scattered or in groups. It is also found in the Port Curtis District and in coastal New South Wales.

Usual Flowering Time.—Erratic throughout the year.

Colour of Honey.—Dark amber.

Importance as Source of Honey.—Minor.

Importance as Source of Pollen.—Minor.

General Remarks.—As for Golden Candlesticks.

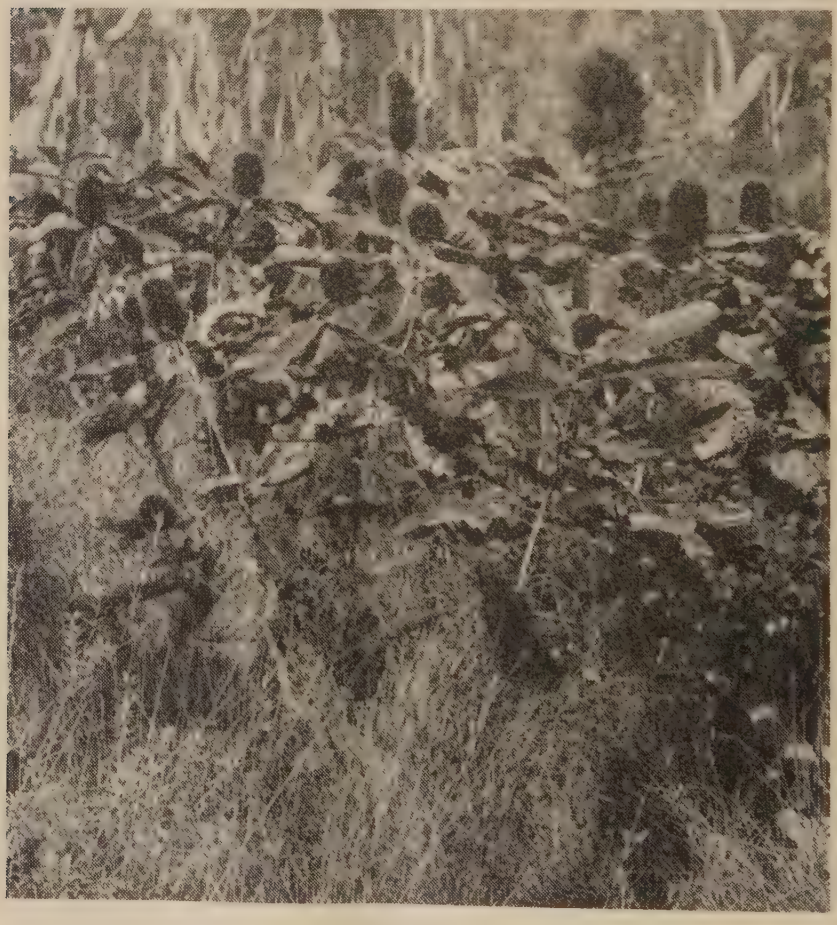

Plate 163.

Broad-leaved Banksia (Banksia robur). Beerburrum.

SHE-OAKS.

She-oaks (sheoke, river oak, forest oak, etc.) are species of *Casuarina*. They are trees with rough, dark-coloured barks and an abundance of slender, faintly striped, jointed, green twigs that are often mistaken for leaves. The true leaves are exceedingly small and appear as tiny teeth at the joints of the twigs and young shoots. There are distinct male and female flowers, usually found on different trees. The male flowers, consisting of a single stamen each, are grouped in very slender orange or brown spikes at the ends of the twigs. The female flowers appear as dense clusters of yellowish or reddish thread-like stigmas protruding from small knobs arranged along the older branches. After flowering a small woody cone develops, consisting of densely compacted seed-capsules which eventually split open to set free the seeds.

Plate 164.

River Oak (Casuarina cunninghamiana). Branchlet. Opened cones at left and unopened cones at right in inset.

River Oak.

Botanical Name.—*Casuarina cunninghamiana* Miq.

Other Common Names.—River she-oak, creek oak.

Distinguishing Features.—This is often a tall tree with dark grey, fissured bark, dark green crown, and spreading to somewhat drooping smaller branches. The twigs are dull green, spreading to drooping, about 3-6 in. long, with 6-8 teeth at each joint. The cones are smaller than those of other species, $\frac{1}{4}$-$\frac{1}{2}$ in. long, about $\frac{1}{4}$ in. wide. (See Plates 164-166).

Distribution.—River oak is confined to the banks of creeks and rivers, where it is often common, sometimes forming a continuous line of trees. It is found along most of the streams of eastern and northern Australia.

Usual Flowering Time.—April-October.

Importance as Source of Honey.—Nil.

Importance as Source of Pollen.—Medium.

General Remarks.—This species, which is worked more readily when other blossoms are not available, provides valuable supplies of pollen. When orange-brown flower particles are present at hive entrances the bees are working *Casuarina.*

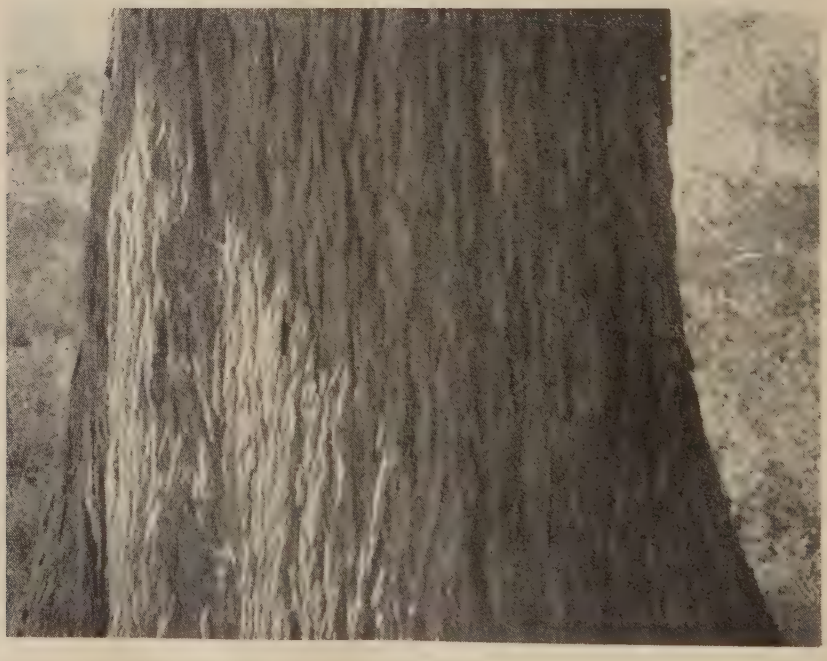

Plate 165.

River Oak (Casuarina cunninghamiana). Portion of trunk.

Plate 166.

River Oak (Casuarina cunninghamiana). Millbrook.

[TO BE CONTINUED.]

QUEENSLAND CANS MOST MEAT.

The following figures for canned meat production in the various States in the year 1955-56 are extracted from *The Meat Producer and Exporter.* The quantities given are tons.

State	*Beef*	*Mutton*	*Pork*	*Miscellaneous*	*Total*
Queensland	26,456	—	1,981	1,619	30,056
Victoria	14,570	5,824	526	7,748	28,668
New South Wales ..	9,318	550	677	1,507	12,052
Western Australia ..	765	303	152	226	1,446
South Australia ..	1	23	4	128	156

Germination in the Carrot Crop

By IAN S. WILSON, Adviser in Horticulture.

The carrot, like many other umbelliferous plants, has a somewhat poor record for germination. This is illustrated by the low minimum standard (50 per cent.) prescribed under the Agricultural Standards Acts for this plant as compared with crops such as the tomato, cabbage and lettuce.

The position is perhaps better now than it was some years ago, but it is still not good; of 112 samples recently tested, 25 were below the prescribed minimum standard while germination in the remainder varied from 50 per cent. to 93 per cent. It is therefore essential that the grower should purchase carrot seed from a reliable source and treat old stocks with considerable suspicion. Good seed may be costly, but even the most expensive seed is a minor item in the total cost of producing the crop.

Field Planting.

The carrot is very exacting in its seedbed requirements and planting does not simply involve burying the seed at the required depth, covering

Plate 1.

A Well-grown Carrot Crop at Redlands Experiment Station. Double-row planting on level ground.

it with soil, and watering. Tilth must be extremely good and firming the soil after sowing is essential. Without proper attention to these two points, there is little chance of the soil coming into close contact with the whole surface of the seed; its fluted coat provides a mechanical barrier. Germination may then be irregular and the strike a commercial failure.

Thorough preparation of the land before planting is necessary and tillage operations should include subsoiling if there is any trace of compaction in the soil within 18 in. of the surface.

Where a cover crop precedes the carrot crop, the land should be ploughed or disced at least six weeks before planting so that the residues will be well decomposed when the seed is sown. A rough surface soil containing large amounts of raw organic matter is not favourable for establishing the crop, as the depth of sowing is variable and much of the seed settles in open "pockets," where it either germinates slowly or fails to germinate at all. In addition, preplanting fumigation for nematode control is often a failure, as the fumigant quickly escapes from the soil into the air.

In clay loams with a shallow subsoil, bedding gives an increased depth of topsoil in which the roots can develop and permits the rapid runoff of surface water after heavy rain. This is an advantage in autumn plantings, for rilling in the row either silts up the germinating seedlings or washes out the young plants. On the deeper sands and sandy loams where bedding is not necessary, the risk of rain damage can be reduced by planting on 12-15 ft. lands.

In both bed and land plantings the soil should be in excellent tilth before sowing and this will usually require one or two light cultivations to control weeds which develop during the later stages of land preparation.

Rapid germination of carrot seed can be expected at temperatures between 65 deg and 85 deg. When temperatures are outside these limits, germination may be speeded up by varying the depth of sowing. In the warm late summer and autumn months, the seed can be sown at a depth of three-quarters of an inch. In late plantings which are made during cool weather, very shallow sowing is permissible.

In either case, planting takes place in soil which has been thoroughly soaked by rain or irrigation and then allowed to dry out on the surface sufficiently for the seed drill to operate without picking up the soil. After planting, a light irrigation is applied to the surface soil; heavy watering is unnecessary, as the subsoil is already wet.

Sowing.

With good quality seed, a planting rate of 4-6 lb. per acre is adequate, but the amount should be increased if there is any doubt as to the viability of the seed.

Several types of planter are available. All require a firm seedbed on which the machine can operate smoothly at a steady walking pace or, if tractor-drawn, without undue vibration or drag. Depth of planting is regulated, as is also seed coverage, and the seed is pressed firmly into the soil by the rear roller. If the surface soil is very loose, a light roller should be run over the land after planting.

Hand planting is not uncommon, even in commercial crops. Shallow drills are prepared by wheel-hoe attachments and the seed is trickled into the drill at a predetermined rate

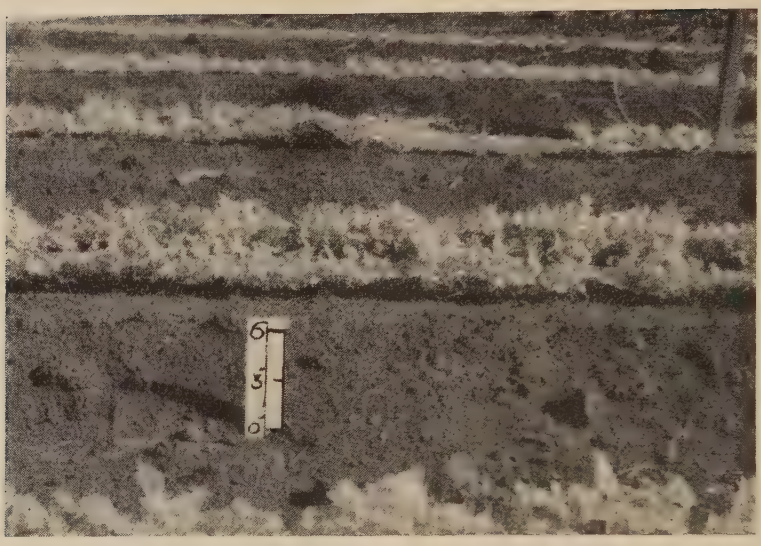

Plate 2.

Young Carrots on Raised Beds. Bedding improves drainage and provides the maximum depth of soil for root development.

or dropped from a tin with a hole in the bottom which is slightly larger than the size of the seed. Sometimes the seed is mixed with a sandy loam to facilitate even distribution. After sowing, the seed is covered by raking in the soil and pressing.

Pre-planting treatment of the seed with a mercurial fungicide is a safeguard against seedling losses from disease.

After Germination.

Germination in the field is comparatively slow and some 9-10 days elapse before a good stand can be expected. Between sowing and germination and when the plants are very small, the surface soil must not be allowed to dry out; frequently light waterings are therefore essential.

High soil temperatures may injure the young seedlings at ground level, for the thin, upright seed-leaves provide little or no shade to the stem. The risk of damage can be reduced by regular light applications of water, which not only keep the soil temperature within the limits the plant can tolerate but also stabilise the soil itself. The latter is particularly important on sandy soils where windblown sand is troublesome: it can reduce a good strike to an indifferent stand by cutting off the seedlings at ground level.

Should caking of the surface soil occur before the seedlings appear above ground, a 4-pronged hoe with very fine tines can be used to break the surface crust and allow the plants to emerge.

A pre-emergence kerosene or white spirit spray applied four or five days after sowing (that is, before the carrots appear above ground) often helps to control weeds which might otherwise cause trouble until the plants reach the 4-fernleaf stage, when the initial weedicidal treatment is usually given.

Training the Young Grape Vine

By A. M. RICHARDSON, Adviser in Horticulture.

The problem of inducing young grape vines to bear consistently is fairly widespread in Queensland. Erratic and indifferent cropping may be due to various causes, the most common being faulty training of the vines themselves and a wrong choice of variety for the particular locality. The trouble occurs both on vines which are lacking in vigour and on vines which show excessive vigour.

Fruiting is usually most erratic in the second and third years after planting. If the vines are unthrifty, they tend to over-produce during this formative period, the quality of the berries being poor while the canes are stunted and incapable of carrying a crop in the following year. On the other hand, in fertile soils and under good seasonal conditions, excessive vigour in the second and third years is frequently associated with the production of small and poorly formed bunches.

The severity of the problem is influenced by the variety, the soil type and the location of the vineyard. If the variety is wholly unsuited to the area, the prospect of remedying the fault by skilful pruning is remote.

Location.

If the vineyard is situated on low-lying or poorly drained land or on land where light frosts nip back the canes each year, there is little one can do about erratic bearing.

Where spring frosts are the main trouble, late pruning is sometimes a help because it delays bud-burst in the vines and holds back blossoming for a week or two until the risk of injury is less acute. It must be remembered, however, that young vines are very susceptible to low temperatures and if severely damaged seldom recover sufficiently to justify the time and effort required to bring them into profit.

When the vineyard is on a warm, well-drained site, and the varieties grown are adapted to local soil and climatic conditions, efficient pruning will, however, go a long way towards producing plants with a strong sturdy frame and capable of early and consistent cropping.

Habits of the Vine.

The grape vine is naturally a creeping or climbing plant and as such requires support. In commercial practice, therefore, a trellis of some kind is almost indispensible. If the vine is allowed to grow unchecked, the annual cane growth becomes progressively weaker; fruit is borne on the extremities of the canes, while much of the older wood remains bare and unfruitful. The bunches produced by vines of this type are small and the berries of very poor quality.

On a trellis, the young vine can be trained to a horizontal position. This tends to reduce vegetative growth and encourage the production of upright fruit-bearing canes.

Although it is not easy to curb the excessive vigour which is often associated with indifferent fruit production in the young vine, the problem must be tackled in the second year after planting. In such vines, heavy pruning reduces the following crop, for the energy of the plant is diverted to vegetative growth. Very light pruning, on the other hand, permits

Plate 1.

An Established Vineyard in Full Bearing. Healthy vines yield up to a half-bushel case of fruit per plant at standard spacings.

the vine to set far too many bunches, some of which will be relatively small with undersized fruit. In both cases, the cropping potential of the vine for the following season is lowered and time is lost before the vineyard settles down to regular bearing.

Pruning practice, therefore, aims at bringing the young vines into early production without any adverse effect on the development of the framework. It is essentially a means of regulating the annual growth and the size of the following crop.

Pruning.

Great importance is attached to growing a strong sturdy plant in the first year. All too frequently, young vines are allowed to fend for themselves during this period and the inevitable result is variable vigour from plant to plant. Under these conditions, many vines will be weak and some may even die, leaving misses in the stand.

Variability in plant growth in the young vineyard can only be avoided

Plate 2.

One-Year-Old Vine Before and After Pruning. The selected cane is secured to the wire and will form the framework.

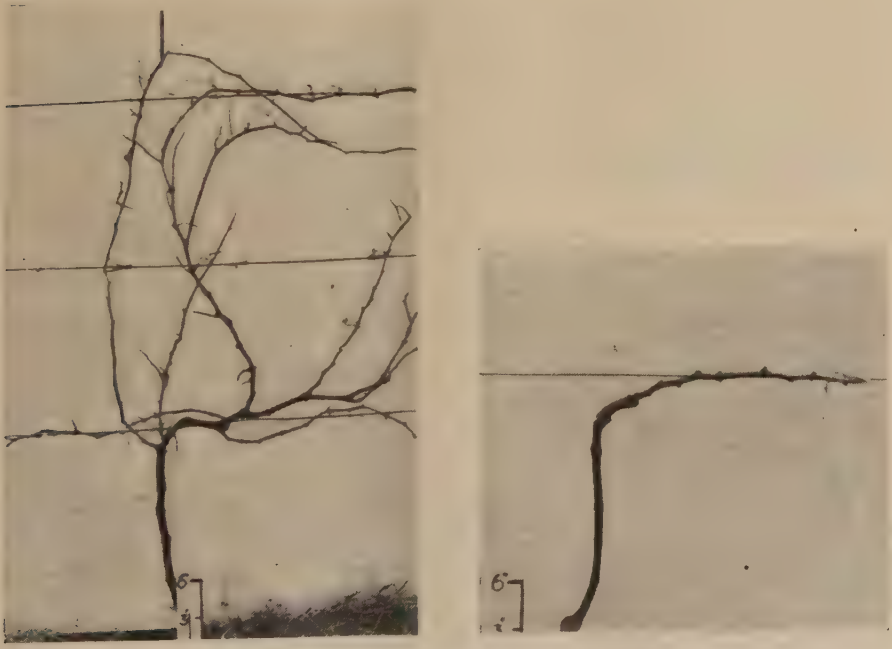

Plate 3.

Two-year-Old Vine Before and After Pruning. The frame is extended each year by "laying" down portion of the end cane. The amount laid down depends on the vigour of the vine.

if the land is cultivated regularly to control weeds and aerate the soil. Upright growth of the leading cane from a rooted cutting must be encouraged by placing a stake alongside each plant to hold it in an upright position so that at the end of the first year a single strong stem is available for tying to the lower wire of the trellis. Lateral shoots developing on this main stem within 18 in. of the ground should be removed shortly after they appear. If this is done, each vine will have one strong stem from which the framework of the mature plant can be formed.

Where, because of neglect or other reasons, growth in the first year has been poor and the stem of the vine is weak and spindly, there is little point in bringing it up to the wire—it will never make good. It is much better to head the vine right back to ground level again and bring a fresh vigorous cane on to the wire in the following year.

Once the vine is established on the wire, the main arm is extended by stages in each successive year. In any one season, the amount of cane laid down to extend the arm will depend on the vigour of the vine. Excessive shortening of the cane in its second year will simply accentuate vegetative growth and therefore suppress the tendency to fruit production. Excessively light pruning has the opposite effect. A compromise is necessary to ensure a proper balance between vegetative growth and fruit production.

Nevertheless, vigorous vines will be pruned less severely than weak vines with a natural propensity to fruit production. In both cases, however, the annual pruning treatment must take into account the need for building up a framework with a strong arm which is able to produce upright-fruiting canes. Each vine must therefore be treated on its merits.

The grape vine remains in production for many years. Although it may be brought into crop at a very early stage, fruit production must not be sought at the expense of vigour, on which the development of the framework depends. Where, however, lack of vigour is general, methods of vineyard management should be closely examined, for no matter how efficient the pruning, it cannot remedy defects due to poor cultural operations or faulty pest and disease control measures.

LEAVE KOALAS IN THE BUSH.

People who find koalas in the bush should leave them there; the animals will be much better off.

This was stated recently by the Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.), who pointed out that picknickers and others often come across koalas. During August, koalas were found at Waterford and at Mt. Gravatt. On the advice of the Department, both animals were left in the bush.

Koalas should not be captured. Not only is this illegal (for koalas are totally protected), but it is usually harmful, as the average person is inexperienced in the ways of koalas. In the bush, their chances of survival are much greater than under most captive conditions. The number of youngsters being found each year suggests that, in some areas, natural conditions are still favourable to breeding.

Mr. Collins said that the apparent build-up in koala numbers is due to the total, permanent protection which has been enforced for 30 years. The Government's policy of protecting koalas is strongly supported by the public, and a very general affection for these unique animals has developed.

Marketing Facilities for Fruit and Vegetables in Cities Overseas

By H. S. HUNTER, Director of Marketing.

(*Continued from page 455 of the August issue.*)

Atlanta.

Atlanta (Georgia), population 500,000, also has moved its fruit and vegetable market out from the centre of the city. In this case mistakes were made. The market was moved out to a distance of three miles from the city centre in 1941 and located on an area of 16 acres, whereas the U.S.D.A. Transportation and Facilities Branch, which conducted the market survey prior to removal, had recommended 75 acres. Adjoining land for expansion would now be too costly to purchase for this purpose, so it is planned to move the market again, but a new site has yet to be decided upon.

The mistakes made in locating the Atlanta market were listed for the writer by the Market Manager as follows:—

(1) Not enough land.

(2) Streets of 80–100 ft. are not wide enough. They should be at least 150 ft. and preferably 200 ft. wide.

(3) No railway siding.

(4) Platforms should be provided to avoid lifting produce from road vehicles. These platforms should be 24 ft. wide to permit the use of trolleys.

(5) Insufficient parking space.

Business in the market has grown from 6 million dollars' worth in 1941 to 43 million dollars' worth in 1954.

Of the products sold in the market, 50 per cent. goes beyond the State, 20 per cent. is consumed in Atlanta and the remaining 30 per cent. goes to other destinations within the State of Georgia.

The market is owned by the State Government and is privately operated under Government supervision.

Indianapolis.

Indianapolis (Indiana) presents an interesting situation in that a new market (the Indianapolis Produce Terminal) and the old market (the Marion County Growers', or South Side, Market) are operating in competition.

Indianapolis has a population of 450,000, and as even the largest cities appear unable to support more than one wholesale fruit and vegetable market, these two markets are probably engaged in a struggle for survival. The volume of business done through the Indianapolis Market in 1947 amounted to approximately 40,000 carlot equivalents with a wholesale value estimated at about 250 million dollars. This produce was distributed chiefly in an area within a 75-mile radius of Indianapolis, a region which has a population of over two million people.

Plate 6.

Indianapolis Produce Terminal.

The erection of the new market, which had only been operating for two months at the time of the writer's visit in 1954, was preceded by a survey conducted in 1948 by the Transport and Facilities Branch of U.S.D.A., in conjunction with the Agricultural College of Purdue University, at the request of the wholesale trade in the city.

The survey confirmed the need for a new market, analysed the advantages and disadvantages of six alternative sites, and estimated the costs of acquiring land and of erecting buildings and other improvements on the various sites and at the old location. The survey team also made estimates of the total amount of revenue that would be needed in respect of each site to meet the cost of operating a market, including all expenses of managing and operating the market, taxes, amortization payments, etc.

The considerations which led to the establishment of a new market were mainly the estimated annual savings of sellers and buyers to be realised through the development of a consolidated wholesale market.

The survey team estimated the savings as follows:—

Sellers and Buyers.	Estimated Annual Savings. (Dollars.)
Wholesale dealers	280,750
Farmers and truckers	188,900
Market buyers	315,000
Total savings estimated	784,650

The estimated savings of wholesale dealers were expected to accrue from economies in handling and delivery expense through the use of efficient truck-height loading platforms in place of the floors of the old market, which were 8 inches above street level, direct delivery to the market by rail and the elimination of time and expense caused by traffic congestion.

The U.S.D.A. Marketing and Facilities Branch in its report of the survey commented as follows:—

"In a consolidated wholesale food terminal, it is reasonable to assume that at least 30 minutes of the present 1 hour and 50 minutes spent in travelling between stores and 15 minutes of the present 26 minutes lost in traffic delays in the market area could be eliminated, or a total of 45 minutes per buyer per market day. If buyer's time and truck are valued at 2 dollars per hour, the time saved by 700 buyers on 300 market days would amount to an annual saving of 315,000 dollars. Thus, one of the principal savings that could be made through the development of a consolidated wholesale market would be realised

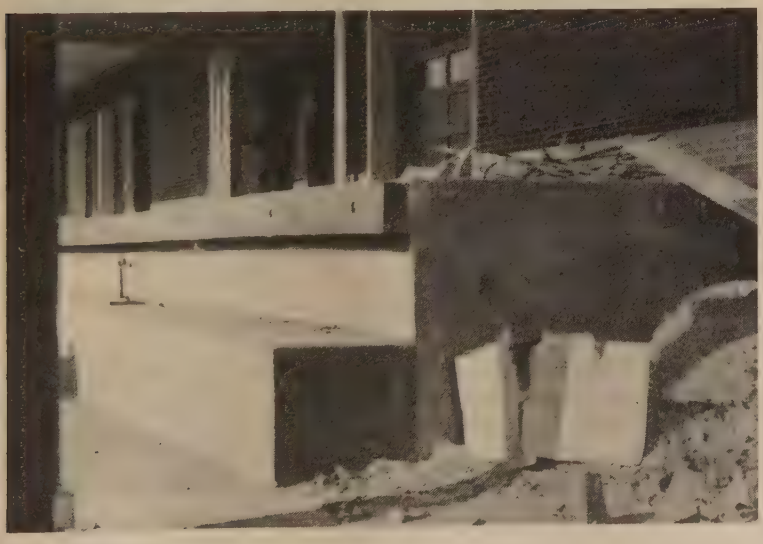

Plate 7.

Truck-height Platform Typical of a New Market (Indianapolis).

through planning the market in such a manner that it would include dealers who would handle all kinds of merchandise required by buyers and so decrease traffic problems for buyers."

As neither State nor municipal authorities showed interest in the proposal for the establishment of a new market, a private company was formed in which most of the largest operators with sections in the existing market took shares. Land was acquired on one of the aforementioned alternative sites and a market to the survey team's design was built at a cost of 2½ million dollars, of which ¼ million dollars was accounted for by railway sidings, including filling and draining, and ¼ million dollars by water supply and sewerage.

Finance was provided by a financial group, interested also in the business of insurance, which purchased in all 250 acres of mainly vacant land surrounding the market site. The market project is therefore part of a larger real estate enterprise.

The new market is situated 3⅛ miles from the centre of the city, but it is located approximately at the centre of population of the area which it serves. It is connected with the adjacent Indianapolis Union Railway and the New York Central Railway by spurs or sidings.

Plate 8.

Administrative Block at Indianapolis Produce Terminal.

A weakness recognised by the survey team was the busy thoroughfare giving direct access to the city, which is wide enough only for one lane of traffic in each direction and incapable of being widened because of the railway on one side and substantial industrial buildings on the other. There are alternative, if somewhat roundabout, routes.

The market area is of 67½ acres, of which 20 acres have been enclosed with a high wire fence within which the buildings have been erected. They consist of the main building, 532 ft. in length, which houses agents' sections, air-conditioned office buildings and a cafeteria. Another

building 337 ft. in length contains ripening rooms for bananas and tomatoes and sections for the occupiers. There is also a farmers' market within the enclosure, comprising two 508 ft. open-air, covered platforms. The area between the buildings is paved with concrete and has a 140 ft. wide roadway. The Market Manager says 150 ft. would have been better.

There was some speculation in Indianapolis in late 1954 as to whether farmers selling direct would desert the old South Side market in the city for the new Produce Terminal in the suburb and the influence their presence or absence might have on the future of either market.

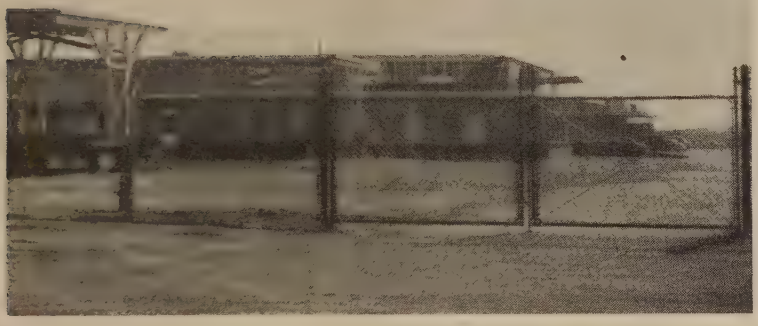

Plate 9.

Farmers' Stands and Portion of the Boundary Fence at Indianapolis Produce Terminal.

The exact volume of business done by farmers is not known, but about 2,500 farmers used the old market in 1947 as a place to sell products from their farms. The survey team that year recorded that of farmers interviewed while selling produce at the Indianapolis Market, half travelled less than 20 miles each way to the market and one-third travelled more than 50 miles each way. One-fifth of the growers had come more than 100 miles and one producer had come 170 miles with a truckload of watermelons. The average distance travelled each way was 42 miles.

Time spent in selling produce, as reported by the growers, ranged from half an hour to 15 hours per load; 56 per cent. reported they spent more than 7 hours per load and 24 per cent. more than 10 hours. The average time reported by all growers was 7 hours per load.

The portion of the market occupied by farmers is usually shared in American markets with merchant truckers. In the old Indianapolis South Side Market, 178 of the 240 stalls reserved for farmers and all of the 90 stalls reserved for truckers were leased on a yearly basis.

Toronto.

Toronto, Canada (population 680,000) also has a new out-of-town market which commenced operating late in 1954. The new market, known as the Ontario Food Terminal, is situated beyond city limits, a distance of 8 miles from the old market, which occupied a cramped position in the old part of the city.

Plate 10.

Farmers' and Truckers' Market at Toronto Food Terminal.

In the writer's view this is one of the most efficient and up-to-date markets in North America. In addition to the city, it supplies goods to the metropolitan area of greater Toronto (population 1,250,000) and beyond.

The city of Toronto was conscious of the inadequacies of its wholesale fruit and vegetable market as far back as the year 1906, when an investigation was held. The problem received attention again in 1912 and 1929. In 1932 the Ontario Minister of Agriculture endeavoured to bring into operation a new market, but the project was suspended when World War II intervened. In 1940 the Economics Division Marketing Service of the Dominion of Canada Department of Agriculture published a survey on "The Wholesale Marketing of Fruit and Vegetables in the City of Toronto" which was conducted during the mid-thirties.

At the conclusion of the War the Ontario Minister for Agriculture re-opened a study of the whole undertaking and a Terminal Markets Committee was appointed to inquire into and report on the many details involved in the construction of a modern wholesale fruit and vegetable and produce market. The Committee included representatives from the fruit and vegetable growers, the Toronto wholesale fruit and produce merchants, the Railways, and the Canadian and Ontario Departments of Agriculture.

The Chief of the Economics Division in the Canadian Department of Agriculture (Dr. Booth) informed the writer that the Committee investigating the Toronto market had the assistance of five or six technical men working in the field. The information they collected was passed to economic officers for collation and study at Ottawa and in the Provincial Department of Agriculture in Toronto.

The survey was designed to show how much produce entered the city market, how much went out, and in what manner and route, time lost due to delays, etc. He said the re-location of a fruit and vegetable market involves so many factors, including purely local considerations, that it is not a thing to be done without adequate study. An economic study of the Montreal market has been in progress over a period of 10-15 years.

The members of the Toronto Terminal Market Committee took counsel from the U.S.D.A. Transportation and Facilities Research Division and visited a number of recently constructed American produce terminals.

The Committee eventually recommended the present 50-acre site, since there was no suitable site within the city limits. It is westward of the city, and 80 per cent. of all fruit and produce entering the city comes from the west. The Ontario Government purchased the land, passed the "Ontario Food Terminal Market Act of 1946," and appointed thereunder a Food Terminal Board to construct, equip and operate a wholesale fruit and produce market as a public utility.

Details of the Ontario Food Terminal are contained in an article by the Chairman of the Board (Mr. G. F. Perkin) published in the 1952 Year Book of The Canadian Fruit Wholesalers' Association, Ottawa.

The Board, which comprises three representatives of the growers and three representatives of the merchants, with an officer of the Ontario Department of Agriculture as Chairman, is authorised, subject to the approval of the Lieutenant-Governor in Council, to make regulations governing the operation and management of the Terminal and prescribe rules governing such matters as hours of business, traffic control, sanitation, etc.

Finance was provided by the Ontario Government on a 25-year amortization plan secured by the rents from 25-year binding leases with the produce trade for warehouse space; rents from the produce trade and allied lines for office space on a per annum basis; daily, monthly and annual stall fees from the Farmers' and Truckers' Market section; revenue from the cold storage plant on a per package basis; together with miscellaneous income from the sale or lease of various concessions and of land for privately owned produce warehouses or allied facilities to be located in the Terminal site.

An important feature of the 25-year lease to the produce trade for warehouse space is that at the end of this period the firms concerned will own their units or stores and meanwhile have the right to transfer or sell them subject to the approval of the Board.

Plate 11.

Farmers' Market at Ontario Food Terminal.

In the Farmers' and Truckers' portion of the new Food Terminal there is accommodation for approximately 400 trucks, parking for as many buyers' vehicles, and space for future expansion.

Plate 12.

Wide Street Between Market Buildings at Toronto.

The main market area consists of a U-shaped block with two parallel produce trading buildings at the sides and cold stores and other installations at the end. The two produce buildings are each 440 ft. x 80 ft. with a 9 ft. covered rear platform at rail car height and a 16 ft. covered sales and delivery front platform at road truck height.

The produce buildings are separated by a street 200 ft in width. The produce buildings are of two stories, with office space on the second floor. Each building has a rail siding at rear and in addition eight acres have been set aside within the market site for railway inspection and holding lines for 180 cars. There are also two lines running into ports at the end of the cold storage end of the block. The entire market area is enclosed by a high K wire and barbed wire fence.

The Ontario Food Terminal had only been operating a few months at the time of the writer's visit in October, 1954. In discussions with the Market Manager, the Officer in Charge of the farmers' and truckers' section, farmer dealers and merchants, everybody stated they were quite happy with the new facility; although it was admitted there was some opposition before trading was moved out from the old market in the city. It was realised that traffic congestion on the main thoroughfare into the city was a disadvantage, but this was in course of rectification by the building of a modern highway—the Queen Elizabeth Highway—into Toronto.

Plate 13.
View of the Toronto Food Terminal.

Columbus.

Columbus, Ohio (population 502,000), like many other large cities, has a mid-town market flanking both sides of a main thoroughfare. The U.S.D.A. Transportation and Facilities Research Division has made a survey for the city which indicates the desirability of relocation. However, the people most concerned (those who operate the market)

have in many instances large investments at stake and they are not influenced in favour of the proposal for relocation by the fervour with which it is advocated by other business interests adjoining the market and which have need of space for expansion. The market operators are not impressed with the argument that they should move out to enable other traders to occupy the area.

Plate 14.

Agents' Stands on a Busy Thoroughfare in the Columbus Market.

Furthermore, fruit and vegetable trading throughout America is in a somewhat uncertain state of transition. More and more produce is by-passing the wholesale markets on its way to the consumer. To protect their businesses, many of the merchants or operators in the wholesale fruit and vegetable markets in Columbus and in some other American cities have equipped their premises with machinery and facilities, including cold storage, for the grading and prepackaging of high quality products, which are displayed and offered for sale under adopted brand names.

MODERN TREND TO BY-PASS WHOLESALE MARKETS.

The trend for fruit and vegetable produce to by-pass the wholesale market is due in part to the changes which are taking place in marketing practices following upon improvement to the nation's highways and the use of long-haul motor trucks equipped with efficient refrigeration, and partly to the development of a system of contract growing for delivery by the grower direct to chain stores, supermarkets and deep freeze or canning establishments.

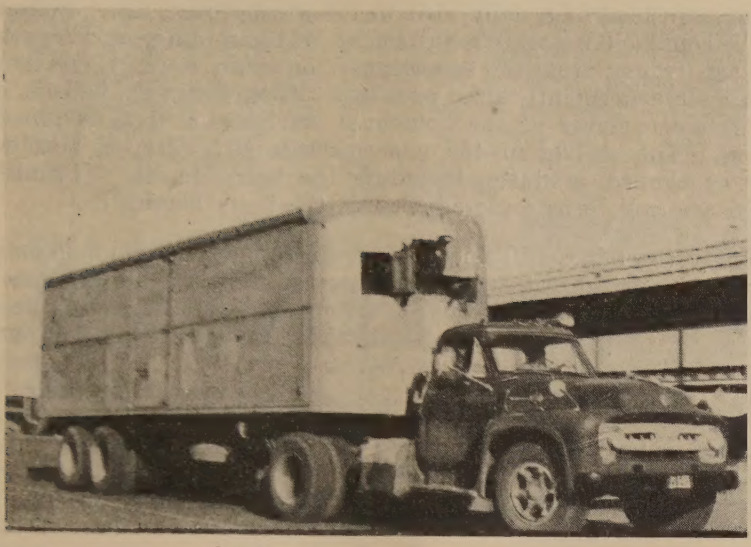

Plate 15.

Refrigerated Semi-trailer for Conveyance of Fruit and Vegetables.

Some of the more important features of the changing scene in the United States are dealt with in the following paragraphs.

Green vegetables, such as beans and peas, are tending to disappear from the wholesale markets. They lend themselves to prepackaging and deep freezing. This is usually done close to the area of production. The vegetables have to be of uniform good quality and at the optimum stage of maturity. The peas are shelled and the beans cut ready for

Plate 16.

An Island Shopping Centre in Southern California.

cooking. Instead of a daily visit to the greengrocer, many housewives buy the household's weekly requirements of beans and peas, prepackaged and deep frozen, from the supermarket or chain store, where they are available in conveniently sized packages. These may then be kept in the deep freeze chamber of the household refrigerator until required for cooking. The shelves of the supermarkets also carry a bewildering array of canned products, including the berry fruits. (Cranberries canned are said to be quite as good as the fresh berries.)

Leafy vegetables still find an outlet through the wholesale markets, although some go direct to the chain stores. New techniques have been introduced into the preparation of these vegetables, mainly to meet the needs of the deep freeze trade, refrigerated transport and cold storage generally. In many instances precooling is practised and this operation usually takes place close to the point of production and soon after harvesting. For example, lettuce grown in California or Texas is precooled under vacuum within an hour of cutting and immediately loaded into iced trucks for despatch to distant markets. The vacuum cooling apparatus, designed by the Vacuum Cooling Company of California, can reduce 1,800 heads of lettuce from a field heat of 70 deg. to 34 deg. in about 30 minutes. The local packing company may supply a chain store company or supermarket with lettuce direct, or alternatively forward consignments to distant wholesale markets.

Another interesting example of the specialised treatment given to certain crops is the preparation of celery for both local and distant markets. Celery has the field heat removed immediately after harvest by a hydrocooling process. The crated celery is passed under a shower of cold (33 deg.) water and carried on a moving belt through a cold water bath before removal to a cool store, where it may be held for periods of up to three or four months in good crisp condition before prepackaging and despatch to market. This service is provided by private packing plants or by growers' co-operatives. Here again the product may be sold direct to retailing chain stores and through wholesale markets.

Similar organisations assemble, wash, grade and pack potatoes and other root crop vegetables. The packages vary in size to suit the needs of all types of customers. Large quantities of root crop vegetables by-pass the wholesale markets on the way to the consumer.

The chain stores to which reference has been made have within their organisations "Distribution Centres" which provide for the individual stores many of the services which the wholesaler provides for independent or single-unit stores. The largest chain store companies in the United States, in order of size, are A. & P. (Atlantic and Pacific), Sears Roebuck and Safeways. A Safeways Distribution Centre which was inspected at Landover Hills, Maryland, occupies a property of 48 acres, of which 16½ acres are under roof. This distribution centre, which is one of 18 established by the firm in U.S.A., passes out 18 million lb. of food products a week to Safeways stores in its Division. An inspection of the huge store confirmed that only top quality products are purchased and supplied to retail units.

Plate 17.
A Chain Store Located in a Suburb for the Convenience of Motorists.

The frozen foods section includes fresh frozen fruits and vegetables, all prepackaged and sold under the brand name "Bel Air." Purchase is made direct from the grower, to whom the Company pays good prices for the pick of his crop.

TRUCKING BY ROAD.

Earlier in this report, the development of long-haul trucking was given as an important factor causing the terminal markets to be by-passed by new marketing channels. It seems only natural that when the increasing demands for produce exceeded the handling capacity of the market, then produce would find other ways of reaching the consumer. When trucking was confined mostly to local delivery and pick-up, the markets were not badly hindered, but with road improvement and the development of long-haul transportation of produce in large refrigerated motor trucks the situation was radically changed.

An important development was the increase in service wholesaling which made it unnecessary for a large number of retailers to spend arduous hours in crowded inefficient markets. This change is primarily one of emphasis, since service wholesalers have always existed, particularly to serve country districts. Nevertheless, it has been found that the large well-established firms, the supermarkets and the chain stores, by using trucks, have been able to by-pass the terminal markets. In order to give some idea of the equipment used and the claimed advantages and disadvantages of long-haul truck transport in competition with railroads, information has been taken from an article published in February, 1955, by the California Agricultural Experiment Station Giannini Foundation of Agricultural Economics. For the extract in question see Appendix A.

[TO BE CONTINUED.]

DAIRYMAN'S HANDBOOK STILL AVAILABLE.

Every dairy farmer needs a handy reference book to which he can turn to find answers to questions on farm and herd management that arise from day to day.

Such a book has been provided in the Queensland edition of "Dairy Farming in Australia," prepared by the Commonwealth Department of Commerce and Agriculture and the Queensland Department of Agriculture and Stock in 1951.

A copy of this book was sent to all suppliers to butter and cheese factories in 1952, and since then many new dairy farmers have been provided with a copy.

Those who did not receive a copy of the book are advised that copies are still available from the Department of Primary Industry, Commonwealth Offices, Adelaide Street, Brisbane. The publication is available free of charge to dairy farmers and share farmers milking 10 cows or more.

Persons who do not qualify for a free issue may obtain copies for 7s. 10d. (9s. 4d. posted) from the address given above.

BIG DEMAND FOR GRASS SEED EXPECTED.

Graziers who are clearing large areas of scrub to plant pastures this season are advised to have sufficient seed on hand to sow the cleared land.

If this land is left ungrassed, weeds and regrowth could become serious problems. Where newly-cleared scrub is burnt, the ash provides an excellent seedbed which will not be equalled in succeeding years on the same country.

If the scrub-clearing machinery and aerial spraying services now available in Queensland are worked at anything like full capacity, the area likely to be sown will run into tens of thousands of acres. The biggest clearing projects are under way in the brigalow and gidyea scrub areas. There will be a huge demand for Rhodes grass, buffel grass and green panic seed to grass these lands. This demand may cause serious shortages of seed and marked increases in seed prices, especially of buffel grass, which is most suitable for the gidyea scrub areas where much of the work is being carried out.

If graziers care to plan ahead, the shortage and high price of commercial grass seed need not greatly handicap pasture improvement projects. The remedy lies in producing home-grown seed. A 20-acre seed plot of buffel grass, for example, can be expected to supply 1,200 lb. of seed within 12 months under normal conditions, when two seed crops are produced. This is sufficient to plant at least 800 acres at planting rates used in western Queensland.

Seed harvesting problems have been largely solved by the development of simple seed-harvesting machines which are already in use in Queensland. One pastoral company near Dirranbandi, using a home-made harvester, has been able to harvest over 2,000 lb. of buffel grass seed from its own seed plots for 1s. a pound. This example should be followed by every grazier who is undertaking large-scale pasture improvement work.

The Department's Agriculture Branch is equipped to advise graziers on home-made grass seed harvesters and on the establishment of seed plots.